

Project information

FLNG PRELUDE EPCI PROJECT

Customer:	SHELL
P.O.No.:	60869M-000-1547-00006-PO-03226
Engineering project number:	
Document number:	2000-03226-F14-10006
Creation date:	24.07.2012 04:38:22 PM CEST
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Review number:	5

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Project remarks

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
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TAG : 100FT-1002

Timestamp:	11.01.2013 01:01:38 PM CET	Review number:	5
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	HC	Ref. Temperature	0 °C
State	Gas	Ref. Pressure	1.013 bar_a
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI (circular)
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.56	9.33	10.26	kg/s
Oper. Pressure		24		bar_g
Oper. Temperature	45		66	°C
Density		30.33		kg/m3
Viscosity		0.013		cP
Z-factor		1.28		
Sound Velocity		339.8		m/s
Pres. design (min/max)			30	bar_g
Temp. design (min/max)			110	°C
Vapor Pressure	5 031.2	5 031.2	5 031.2	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN150 6"
Minimum Flow	0 kg/s
Maximum Flow	33.7 kg/s
Material (sensor)	SS 1.4404 / 316L
Process connection	DN150 6" CI 300 ANSI / 316L/1.4404 ASME
PED category** :	B16.5 flange
	Application is Cat. III

Order Code

Qty	Item	Description	Extended Order Code
1	Flowmeter	Promass 83F	83F1F-E999F91NA8DKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

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Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.56	9.33	10.26	kg/s
Pressure loss	6.306E-4	0.115	0.137	bar
Velocity (meas. tube)	2.475	41.25	45.36	m/s
Measured error Mass***	1.59	0.35	0.35	%
Reynolds No.		6 631 308		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:05:09 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

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Tri-size Sheet

General Parameters

Fluid	HC	Ref. Temperature	0 °C
State	Gas	Ref. Pressure	1.013 bar_a
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI (circular)
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN100 4"	DN150 6"	DN250 10"	
Process connection	DN100 4" CI 300 ANSI/316L	DN150 6" CI 300 ANSI/316L	DN250 10" CI 300 ANSI/316L	
Minimum Flow	0	0	0	kg/s
Maximum Flow	22.683	33.7	92.675	kg/s
Pressure loss at req. Flow min.	0.002	6.306E-4	1.417E-4	bar
Pressure loss at req. Flow nom.	0.3	0.115	0.026	bar
Pressure loss at req. Flow max.	0.357	0.137	0.031	bar
Velocity (meas. tube) at req. Flow min.	4.482	2.475	1.124	m/s
Velocity (meas. tube) at req. Flow nom.	74.7	41.25	18.73	m/s
Velocity (meas. tube) at req. Flow max.	82.15	45.36	20.59	m/s
Measured error Vol. at req. Flow min.***	n.a.	n.a.	n.a.	%
Measured error Vol. at req. Flow nom.***	n.a.	n.a.	n.a.	%
Measured error Vol. at req. Flow max.***	n.a.	n.a.	n.a.	%
Measured error Spec. Vol. at req. Flow min.***	n.a.	n.a.	n.a.	%
Measured error Spec. Vol. at req. Flow nom.***	n.a.	n.a.	n.a.	%
Measured error Spec. Vol. at req. Flow max.***	n.a.	n.a.	n.a.	%
Measured error Mass at req. Flow min.***	0.69	1.59	4.37	%
Measured error Mass at req. Flow nom.***	0.35	0.35	0.35	%
Measured error Mass at req. Flow max.***	0.35	0.35	0.35	%
Measured error Spec. Mass at req. Flow min.***	n.a.	n.a.	n.a.	%
Measured error Spec. Mass at req. Flow nom.***	n.a.	n.a.	n.a.	%
Measured error Spec. Mass at req. Flow max.***	n.a.	n.a.	n.a.	%
Reynolds No.	8 923 772	6 631 308	4 467 994	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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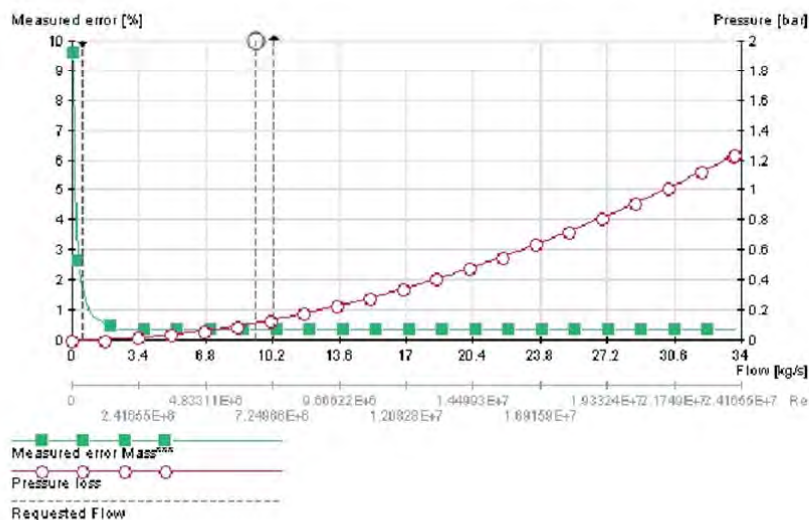
Timestamp: 11.01.2013 01:01:38 PM CET
Document number: 2000-03226-F14-10006

Review number: 5

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN150 6"
Minimum Flow: 0 kg/s
Maximum Flow: 33.7 kg/s



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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TAG : 100FT-1026

Timestamp: 11.01.2013 01:33:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	52.2	174	191.4	m3/h
Oper. Pressure		3.8		bar_g
Oper. Temperature	76		133	°C
Density		714.4		kg/m3
Viscosity		0.58		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			10	bar_g
Temp. design (min/max)			210	°C
Vapor Pressure	1.8	1.8	1.8	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN100 4"
Minimum Flow	0 m3/h
Maximum Flow	489.922 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN100 4" CI 150 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F1H-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Applicator Sizing - Flow

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Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	52.2	174	191.4	m3/h
Pressure loss	0.026	0.241	0.287	bar
Velocity (meas. tube)	3.521	11.74	12.91	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		1 036 165		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

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Applicator Sizing - Flow

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Tri-Size Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN80 3"	DN100 4"	DN150 6"	
Process connection	DN80 3" CI 150 ANSI/316L	DN100 4" CI 150 ANSI/316L	DN150 6" CI 150 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	251.96	489.922	1 119.82	m3/h
Pressure loss at req. Flow min.	0.081	0.026	0.01	bar
Pressure loss at req. Flow nom.	0.747	0.241	0.092	bar
Pressure loss at req. Flow max.	0.891	0.287	0.11	bar
Velocity (meas. tube) at req. Flow min.	5.628	3.521	1.945	m/s
Velocity (meas. tube) at req. Flow nom.	18.76	11.74	6.482	m/s
Velocity (meas. tube) at req. Flow max.	20.64	12.91	7.13	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.09	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	1 309 917	1 036 165	769 980	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

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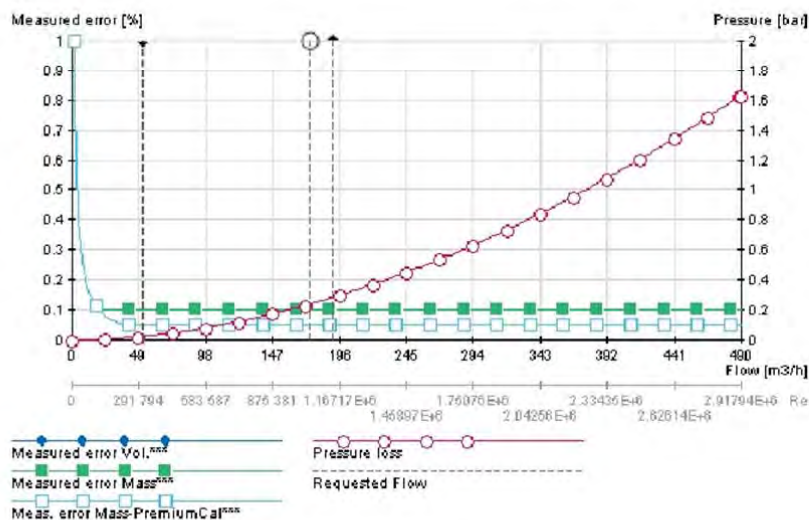
Timestamp: 11.01.2013 01:33:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN100 4"
Minimum Flow: 0 m3/h
Maximum Flow: 489.922 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Applicator Sizing - Flow

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Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1029 Case 1

Timestamp: 11.01.2013 01:38:59 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	5.52	92	101.2	m3/h
Oper. Pressure		69		bar_g
Oper. Temperature	10		110	°C
Density		991		kg/m3
Viscosity		0.59		cSt
Sound Velocity		1 619		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)	-40		120	°C
Vapor Pressure	2.405		4.632	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	181.635 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application excluded

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-F999F91NA8EKKPKJZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum sands content is 0.25 lbs/mmscf, with a maximum particle size of 260 µm.

Applicator Sizing - Flow

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Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	5.52	92	101.2	m3/h
Pressure loss	0.002	0.319	0.381	bar
Velocity (meas. tube)	0.595	9.919	10.91	m/s
Measured error Vol.***	0.16	0.1	0.1	%
Measured error Mass***	0.16	0.1	0.1	%
Meas. error Mass- PremiumCal***	0.16	0.05	0.05	%
Reynolds No.		680 861		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

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Tri-Size Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI / Alloy C-22	DN80 3" CI 600 ANSI / Alloy C-22	DN100 4" CI 600 ANSI / Alloy C-22	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.636	181.635	353.179	m3/h
Pressure loss at req. Flow min.	0.011	0.002	5.64E-4	bar
Pressure loss at req. Flow nom.	2.031	0.319	0.103	bar
Pressure loss at req. Flow max.	2.423	0.381	0.123	bar
Velocity (meas. tube) at req. Flow min.	1.444	0.595	0.372	m/s
Velocity (meas. tube) at req. Flow nom.	24.07	9.919	6.206	m/s
Velocity (meas. tube) at req. Flow max.	26.47	10.91	6.827	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.16	0.26	%
Meas. error Vol. at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.16	0.26	%
Meas. error Mass at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.06	0.16	0.26	%
Meas. error Spec. Mass at req. Flow nom.***	n.a.	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	1 060 572	680 861	538 572	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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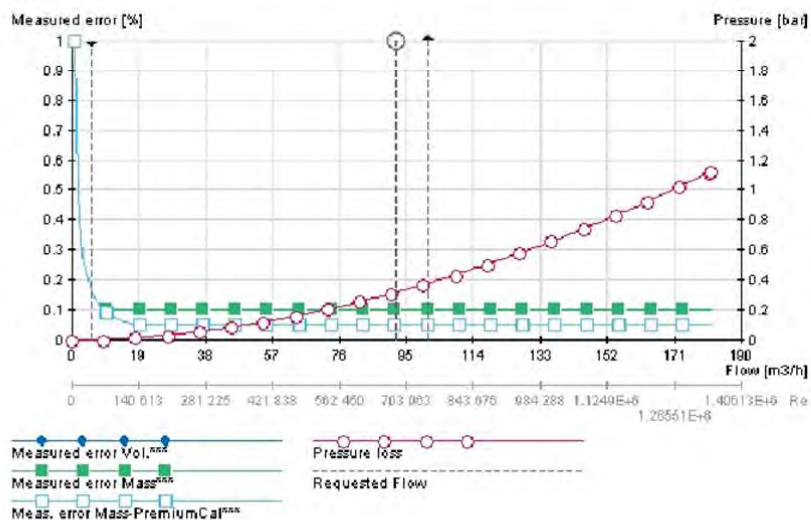
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Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 181.635 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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TAG : 100FT-1029 Case 2

Timestamp: 05.03.2013 09:55:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	2.76	46	50.6	m3/h
Oper. Pressure		31.5		bar_g
Oper. Temperature	10		110	°C
Density		989.6		kg/m3
Viscosity		0.55		cSt
Sound Velocity		1 619		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)	-40		120	°C
Vapor Pressure	2.405		4.632	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	181.892 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application excluded

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-F999F91NA8EKKPKJZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum sands content is 0.25 lbs/mmscf, with a maximum particle size of 260 µm.

Print date: 05.03.2013 11:06:25 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1029 Case 2

Timestamp: 05.03.2013 09:55:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	2.76	46	50.6	m3/h
Pressure loss	4.77E-4	0.087	0.104	bar
Velocity (meas. tube)	0.298	4.959	5.455	m/s
Measured error Vol.***	0.33	0.1	0.1	%
Measured error Mass***	0.33	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.33	0.05	0.05	%
Reynolds No.		365 189		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:06:25 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

Fax: 0033825888009

TAG : 100FT-1029 Case 2

Timestamp: 05.03.2013 09:55:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI / Alloy C-22	DN80 3" CI 600 ANSI / Alloy C-22	DN100 4" CI 600 ANSI / Alloy C-22	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.736	181.892	353.678	m3/h
Pressure loss at req. Flow min.	0.003	4.77E-4	1.535E-4	bar
Pressure loss at req. Flow nom.	0.553	0.087	0.028	bar
Pressure loss at req. Flow max.	0.659	0.104	0.033	bar
Velocity (meas. tube) at req. Flow min.	0.722	0.298	0.186	m/s
Velocity (meas. tube) at req. Flow nom.	12.03	4.959	3.103	m/s
Velocity (meas. tube) at req. Flow max.	13.24	5.455	3.413	m/s
Meas. error Vol. at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	568 852	365 189	288 870	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:07:41 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1029 Case 2

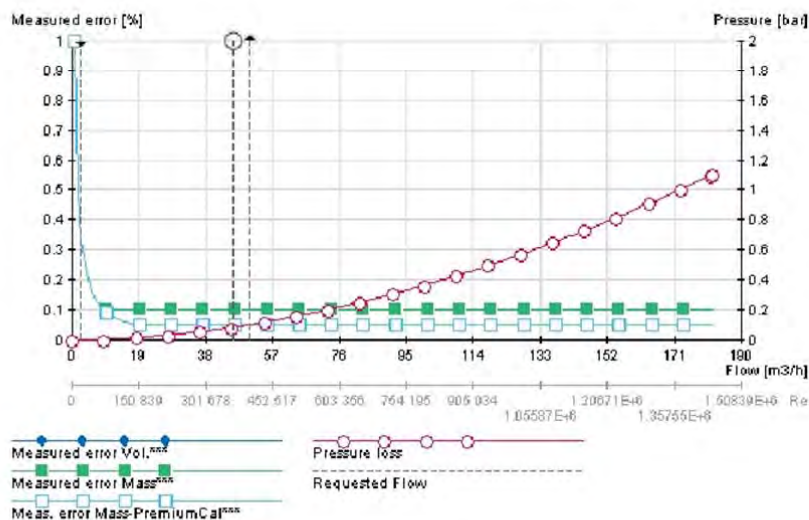
Timestamp: 05.03.2013 09:55:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 181.892 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:07:41 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1031

Timestamp: 11.01.2013 01:44:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Demulsifier		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.003	0.003	0.027	m3/h
Oper. Pressure		74		bar_g
Oper. Temperature		29		°C
Density	930		970	kg/m3
Viscosity		21.7		cSt
Sound Velocity		1 512		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)			120	°C
Vapor Pressure	0.0199	0.035	0.25	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN08 3/8"
Minimum Flow	0 m3/h
Maximum Flow	2.105 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F08-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1031

Timestamp: 11.01.2013 01:44:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.003	0.003	0.027	m3/h
Pressure loss	0.001	0.001	0.015	bar
Velocity (meas. tube)	0.017	0.016	0.164	m/s
Measured error Vol.***	1.17	1.19	0.12	%
Measured error Mass***	1.17	1.19	0.12	%
Meas. error Mass- PremiumCal***	1.17	1.19	0.12	%
Reynolds No.		4		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
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		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 100FT-1031

Timestamp:	11.01.2013 01:44:57 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Tri-Size Sheet

General Parameters

Fluid	Demulsifier		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter		Promass 83F	Promass 83F	
Flow Principle		Coriolis (Promass)	Coriolis (Promass)	
Meter Size		DN08 3/8"	DN15 1/2"	
Process connection		DN15 1/2" CI 600 ANSI / Alloy C-22	DN15 1/2" CI 600 ANSI / Alloy C-22	
Minimum Flow		0	0	m3/h
Maximum Flow		2.105	6.842	m3/h
Pressure loss at req. Flow min.		0.001	2.938E-4	bar
Pressure loss at req. Flow nom.		0.001	2.886E-4	bar
Pressure loss at req. Flow max.		0.015	0.003	bar
Velocity (meas. tube) at req. Flow min.		0.017	0.007	m/s
Velocity (meas. tube) at req. Flow nom.		0.016	0.007	m/s
Velocity (meas. tube) at req. Flow max.		0.164	0.068	m/s
Meas. error Vol. at req. Flow min.***		1.17	7.8	%
Meas. error Vol. at req. Flow nom.***		1.19	7.94	%
Meas. error Vol. at req. Flow max.***		0.12	0.79	%
Meas. error Mass at req. Flow min.***		1.17	7.8	%
Meas. error Mass at req. Flow nom.***		1.19	7.94	%
Meas. error Mass at req. Flow max.***		0.12	0.79	%
Meas. error Spec. Mass at req. Flow min.***		1.17	7.8	%
Meas. error Spec. Mass at req. Flow nom.***		1.19	7.94	%
Meas. error Spec. Mass at req. Flow max.***		0.12	0.79	%
Reynolds No.		4	3	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1031

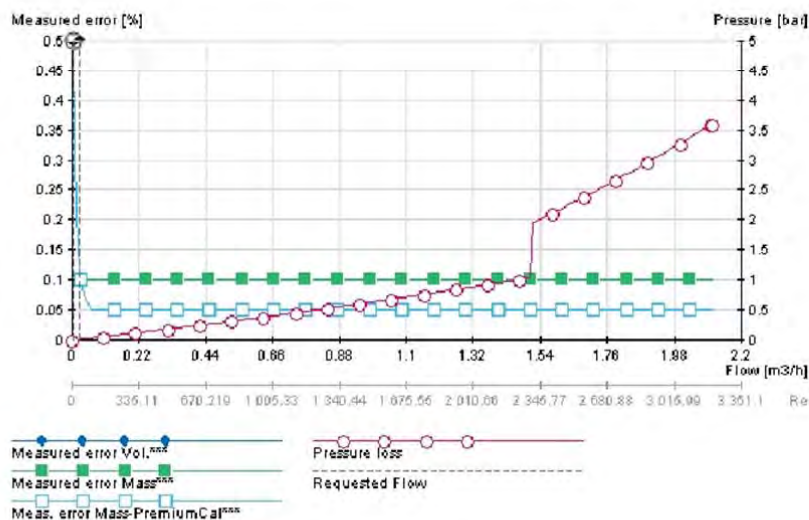
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Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN08 3/8"
Minimum Flow: 0 m3/h
Maximum Flow: 2.105 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:07:41 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1041

Timestamp: 11.01.2013 04:48:50 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	17.955	359	394.9	m3/h
Oper. Pressure		3.5		bar_g
Oper. Temperature	35		41	°C
Density		742.9		kg/m3
Viscosity		0.81		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			12	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	0.66	0.66	0.66	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN150 6"
Minimum Flow	0 m3/h
Maximum Flow	1 076.86 m3/h
Material (sensor)	SS 1.4404 / 316L -3.1B
Process connection	DN150 6" CI 150 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F1F-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1041

Timestamp: 11.01.2013 04:48:50 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	17.955	359	394.9	m3/h
Pressure loss	0.002	0.398	0.474	bar
Velocity (meas. tube)	0.669	13.37	14.71	m/s
Measured error Vol.***	0.24	0.1	0.1	%
Measured error Mass***	0.24	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.24	0.05	0.05	%
Reynolds No.		1 137 543		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:08:04 AM CET
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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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Fax: 0033825888009

TAG : 100FT-1041

Timestamp: 11.01.2013 04:48:50 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN100 4"	DN150 6"	DN250 10"	
Process connection	DN100 4" CI 150 ANSI/316L	DN150 6" CI 150 ANSI/316L	DN250 10" CI 150 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	471.127	1 076.86	2 961.37	m3/h
Pressure loss at req. Flow min.	0.004	0.002	3.466E-4	bar
Pressure loss at req. Flow nom.	1.038	0.398	0.088	bar
Pressure loss at req. Flow max.	1.238	0.474	0.105	bar
Velocity (meas. tube) at req. Flow min.	1.211	0.669	0.304	m/s
Velocity (meas. tube) at req. Flow nom.	24.22	13.37	6.071	m/s
Velocity (meas. tube) at req. Flow max.	26.64	14.71	6.678	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.24	0.66	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.24	0.66	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.1	0.24	0.66	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	1 530 795	1 137 543	766 445	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1041

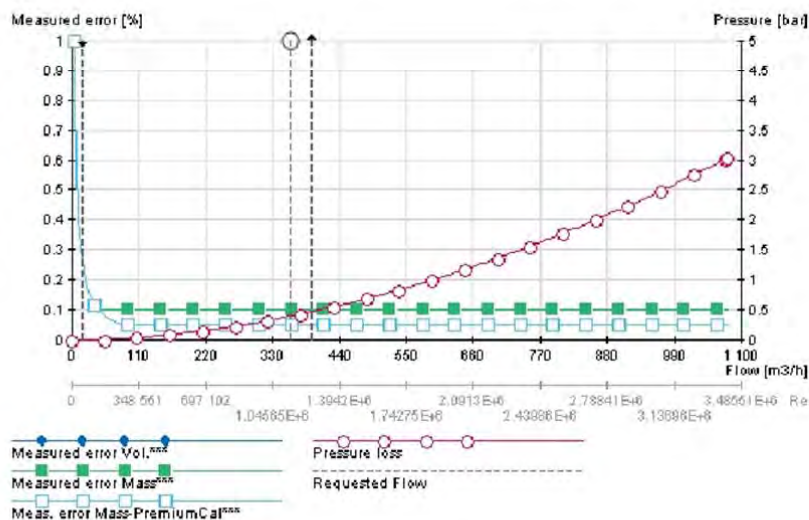
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Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN150 6"
Minimum Flow: 0 m3/h
Maximum Flow: 1 076.86 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:08:04 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 1

Timestamp: 11.01.2013 04:53:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	18.412	92.1	101.3	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		743		kg/m3
Viscosity		0.81		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	0.66	0.66	0.66	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	242.261 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Print date: 05.03.2013 11:08:04 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 1

Timestamp: 11.01.2013 04:53:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	18.412	92.1	101.3	m3/h
Pressure loss	0.013	0.26	0.31	bar
Velocity (meas. tube)	1.985	9.929	10.92	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.07	0.05	0.05	%
Reynolds No.		496 475		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:08:04 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

Fax: 0033825888009

TAG : 100FT-1044 Case 1

Timestamp: 11.01.2013 04:53:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	94.213	242.261	471.063	m3/h
Pressure loss at req. Flow min.	0.084	0.013	0.004	bar
Pressure loss at req. Flow nom.	1.657	0.26	0.084	bar
Pressure loss at req. Flow max.	1.976	0.31	0.1	bar
Velocity (meas. tube) at req. Flow min.	4.816	1.985	1.242	m/s
Velocity (meas. tube) at req. Flow nom.	24.09	9.929	6.213	m/s
Velocity (meas. tube) at req. Flow max.	26.5	10.92	6.834	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.07	0.1	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	773 355	496 475	392 719	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:08:04 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 1

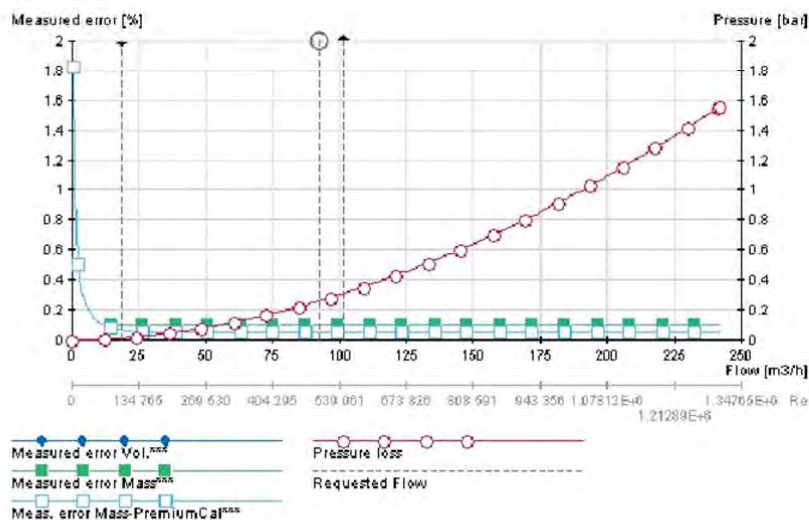
Timestamp: 11.01.2013 04:53:57 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 242.261 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1044 Case 2

Timestamp: 11.01.2013 04:56:20 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	18.411	92.055	101.31	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		1 095		kg/m3
Viscosity		1		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	0.66	0.66	0.66	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	164.384 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Print date: 05.03.2013 11:08:59 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 2

Timestamp: 11.01.2013 04:56:20 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	18.411	92.055	101.31	m3/h
Pressure loss	0.02	0.402	0.481	bar
Velocity (meas. tube)	1.985	9.925	10.92	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass- PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		401 947		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:08:59 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 2

Timestamp: 11.01.2013 04:56:20 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	63.927	164.384	319.635	m3/h
Pressure loss at req. Flow min.	0.13	0.02	0.007	bar
Pressure loss at req. Flow nom.	2.561	0.402	0.13	bar
Pressure loss at req. Flow max.	3.058	0.481	0.155	bar
Velocity (meas. tube) at req. Flow min.	4.816	1.985	1.242	m/s
Velocity (meas. tube) at req. Flow nom.	24.08	9.925	6.21	m/s
Velocity (meas. tube) at req. Flow max.	26.5	10.92	6.834	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.07	%
Meas. error Spec. Mass at req. Flow nom.***	n.a.	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	626 110	401 947	317 947	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:08:59 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1044 Case 2

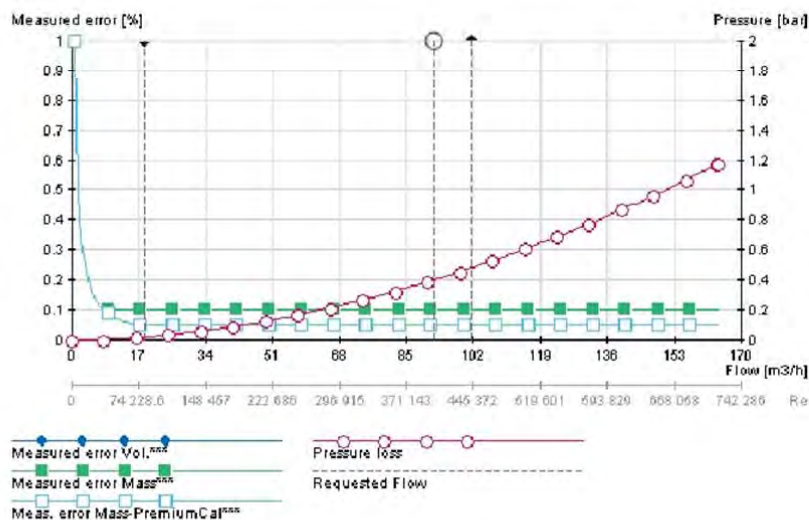
Timestamp: 11.01.2013 04:56:20 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 164.384 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:08:59 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1045 Case 1

Timestamp: 11.01.2013 04:59:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.3	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		743		kg/m3
Viscosity		0.81		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	0.66	0.66	0.66	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	242.261 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 100FT-1045 Case 1

Timestamp: 11.01.2013 04:59:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.3	m3/h
Pressure loss	0.028	0.26	0.31	bar
Velocity (meas. tube)	2.979	9.929	10.92	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass- PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		496 475		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:08:59 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 100FT-1045 Case 1

Timestamp:	11.01.2013 04:59:04 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Tri-Size Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	94.213	242.261	471.063	m3/h
Pressure loss at req. Flow min.	0.179	0.028	0.009	bar
Pressure loss at req. Flow nom.	1.657	0.26	0.084	bar
Pressure loss at req. Flow max.	1.976	0.31	0.1	bar
Velocity (meas. tube) at req. Flow min.	7.228	2.979	1.864	m/s
Velocity (meas. tube) at req. Flow nom.	24.09	9.929	6.213	m/s
Velocity (meas. tube) at req. Flow max.	26.5	10.92	6.834	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.07	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	773 355	496 475	392 719	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:08:59 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1045 Case 1

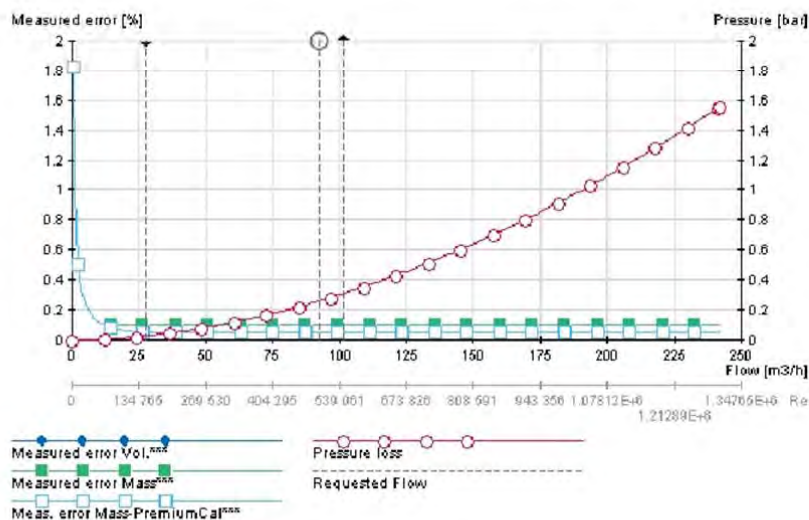
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Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 242.261 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:09:38 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1045 Case 2

Timestamp: 05.03.2013 10:04:30 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.21	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		1 095		kg/m3
Viscosity		1		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	1.4811E-11	1.4811E-11	1.1856E-7	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	164.384 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum sands content is 0.1 lbs/mm³cf, with a maximum particle size of 10 µm.

Print date: 05.03.2013 11:09:38 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1045 Case 2

Timestamp: 05.03.2013 10:04:30 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.21	m3/h
Pressure loss	0.043	0.403	0.48	bar
Velocity (meas. tube)	2.979	9.929	10.91	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		402 145		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:09:38 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1045 Case 2

Timestamp: 05.03.2013 10:04:30 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	63.927	164.384	319.635	m3/h
Pressure loss at req. Flow min.	0.276	0.043	0.014	bar
Pressure loss at req. Flow nom.	2.564	0.403	0.13	bar
Pressure loss at req. Flow max.	3.052	0.48	0.154	bar
Velocity (meas. tube) at req. Flow min.	7.228	2.979	1.864	m/s
Velocity (meas. tube) at req. Flow nom.	24.09	9.929	6.213	m/s
Velocity (meas. tube) at req. Flow max.	26.48	10.91	6.827	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow nom.***	n.a.	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	626 418	402 145	318 103	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:09:38 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1045 Case 2

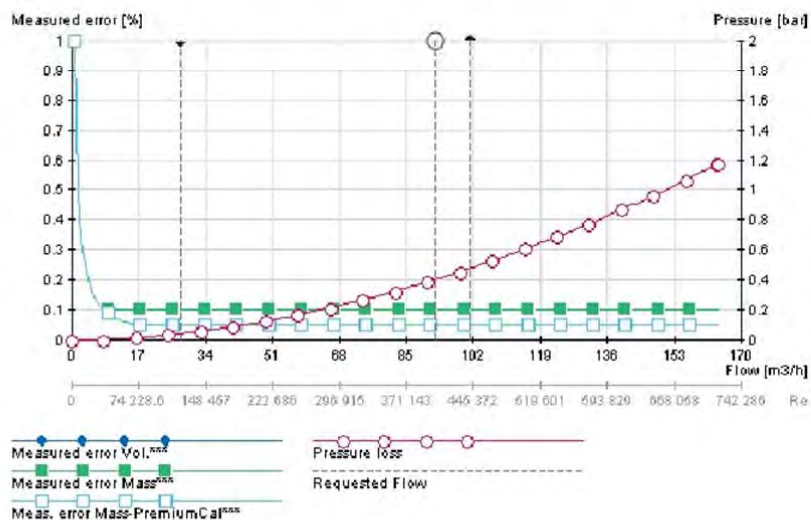
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Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 164.384 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:09:38 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1046 Case 1

Timestamp: 11.01.2013 05:02:30 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.3	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		743		kg/m3
Viscosity		0.81		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	0.66	0.66	0.66	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	242.261 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1046 Case 1

Timestamp: 11.01.2013 05:02:30 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.3	m3/h
Pressure loss	0.028	0.26	0.31	bar
Velocity (meas. tube)	2.979	9.929	10.92	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		496 475		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:09:38 AM CET
Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1046 Case 1

Timestamp: 11.01.2013 05:02:30 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	HC + Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	94.213	242.261	471.063	m3/h
Pressure loss at req. Flow min.	0.179	0.028	0.009	bar
Pressure loss at req. Flow nom.	1.657	0.26	0.084	bar
Pressure loss at req. Flow max.	1.976	0.31	0.1	bar
Velocity (meas. tube) at req. Flow min.	7.228	2.979	1.864	m/s
Velocity (meas. tube) at req. Flow nom.	24.09	9.929	6.213	m/s
Velocity (meas. tube) at req. Flow max.	26.5	10.92	6.834	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.07	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	773 355	496 475	392 719	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:09:38 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1046 Case 1

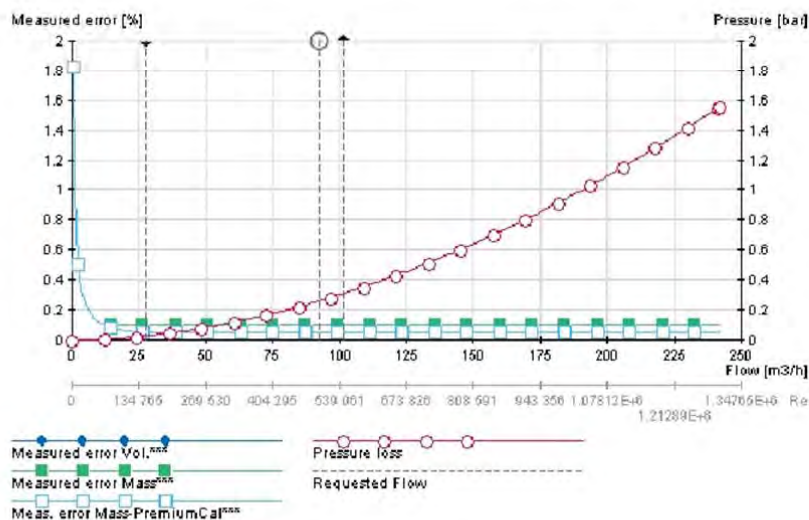
Timestamp: 11.01.2013 05:02:30 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 242.261 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1046 Case 2

Timestamp: 11.01.2013 05:04:12 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.21	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature	25		65	°C
Density		1 095		kg/m3
Viscosity		1		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)			90	°C
Vapor Pressure	1.4811E-11	1.4811E-11	1.1856E-7	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	164.384 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Print date: 05.03.2013 11:10:18 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1046 Case 2

Timestamp: 11.01.2013 05:04:12 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	27.63	92.1	101.21	m3/h
Pressure loss	0.043	0.403	0.48	bar
Velocity (meas. tube)	2.979	9.929	10.91	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		402 145		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:10:18 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1046 Case 2

Timestamp: 11.01.2013 05:04:12 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	63.927	164.384	319.635	m3/h
Pressure loss at req. Flow min.	0.276	0.043	0.014	bar
Pressure loss at req. Flow nom.	2.564	0.403	0.13	bar
Pressure loss at req. Flow max.	3.052	0.48	0.154	bar
Velocity (meas. tube) at req. Flow min.	7.228	2.979	1.864	m/s
Velocity (meas. tube) at req. Flow nom.	24.09	9.929	6.213	m/s
Velocity (meas. tube) at req. Flow max.	26.48	10.91	6.827	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow nom.***	n.a.	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	626 418	402 145	318 103	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:18 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1046 Case 2

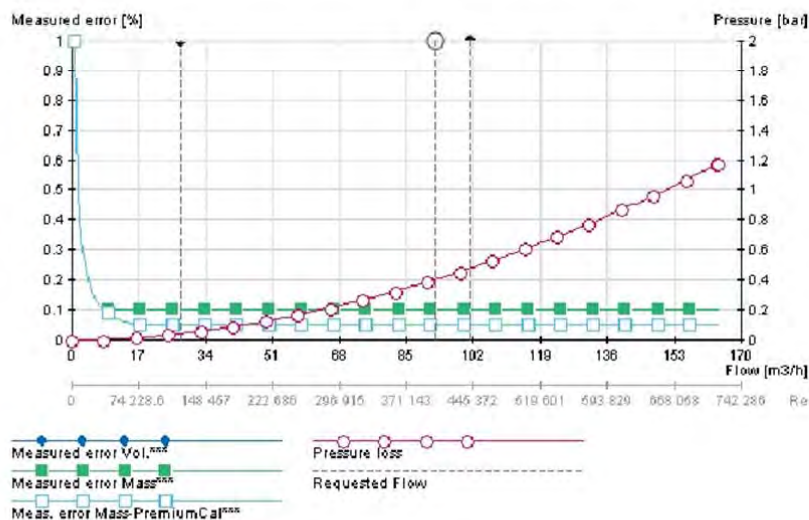
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Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 164.384 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1052

Timestamp: 05.03.2013 10:06:12 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.076	0.38	2.28	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature		107		°C
Density		953		kg/m3
Viscosity		0.27		cSt
Sound Velocity		1 541		m/s
Pres. design (min/max)			30	bar_g
Temp. design (min/max)			160	°C
Vapor Pressure	1.29	1.29	1.29	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN25 1"
Minimum Flow	0 m3/h
Maximum Flow	18.888 m3/h
Material (sensor)	Alloy C-22/2.4602, ext.temp.
Process connection	DN25 1" CI 300 ANSI / Alloy C-22/2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F25-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Print date: 05.03.2013 11:10:18 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1052

Timestamp: 05.03.2013 10:06:12 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.076	0.38	2.28	m3/h
Pressure loss	8.54E-5	0.002	0.047	bar
Velocity (meas. tube)	0.093	0.467	2.8	m/s
Measured error Vol.***	0.71	0.14	0.1	%
Measured error Mass***	0.71	0.14	0.1	%
Meas. error Mass-PremiumCal***	0.71	0.14	0.05	%
Reynolds No.		20 740		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1052

Timestamp: 05.03.2013 10:06:12 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN15 1/2"	DN25 1"	DN40 1 1/2"	
Process connection	DN15 1/2" CI 300 ANSI/Alloy C-22	DN25 1" CI 300 ANSI/Alloy C-22	DN40 1 1/2" CI 300 ANSI/Alloy C-22	
Minimum Flow	0	0	0	m3/h
Maximum Flow	6.821	18.888	47.219	m3/h
Pressure loss at req. Flow min.	2.607E-4	8.54E-5	1.573E-5	bar
Pressure loss at req. Flow nom.	0.005	0.002	3.124E-4	bar
Pressure loss at req. Flow max.	0.142	0.047	0.009	bar
Velocity (meas. tube) at req. Flow min.	0.194	0.093	0.043	m/s
Velocity (meas. tube) at req. Flow nom.	0.975	0.467	0.217	m/s
Velocity (meas. tube) at req. Flow max.	5.853	2.8	1.302	m/s
Meas. error Vol. at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.14	0.62	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.14	0.62	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.06	0.14	0.62	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.1	%
Reynolds No.	29 986	20 740	14 141	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:18 AM CET

- 52 / 141 -

Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1052

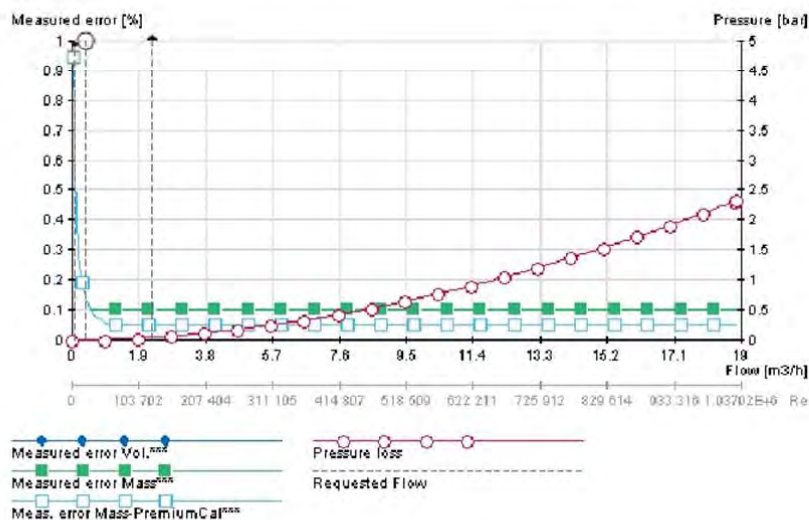
Timestamp: 05.03.2013 10:06:12 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN25 1"
Minimum Flow: 0 m3/h
Maximum Flow: 18.888 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

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TAG : 100FT-1055

Timestamp: 11.01.2013 05:08:18 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Anti foam		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.001	0.001	0.006	m3/h
Oper. Pressure		74		bar_g
Oper. Temperature		29		°C
Density		1 004		kg/m3
Viscosity		2 000		cSt
Sound Velocity		1 512		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)			120	°C
Vapor Pressure	0.0199	0.035	2.025	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN8 3/8"
Minimum Flow	0 m3/h
Maximum Flow	1.992 m3/h
Material (sensor)	Alloy C-22/2.4602, ext.temp
Process connection	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F08-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 100FT-1055

Timestamp: 11.01.2013 05:08:18 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.001	0.001	0.006	m3/h
Pressure loss	0.077	0.077	0.307	bar
Velocity (meas. tube)	0.009	0.009	0.035	m/s
Measured error Vol.***	2.08	2.08	0.52	%
Measured error Mass***	2.08	2.08	0.52	%
Meas. error Mass- PremiumCal***	2.08	2.08	0.52	%
Reynolds No.		0		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1055

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Document number: 2000-03226-F14-10006

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Tri-Size Sheet

General Parameters

Fluid	Anti Foam		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter		Promass 83F	Promass 83F	
Flow Principle		Coriolis (Promass)	Coriolis (Promass)	
Meter Size		DN8 3/8"	DN15 1/2"	
Process connection		DN15 1/2" CI 600 ANSI / Alloy C-22	DN15 1/2" CI 600 ANSI / Alloy C-22	
Minimum Flow		0	0	m3/h
Maximum Flow		1.992	6.474	m3/h
Pressure loss at req. Flow min.		0.077	0.015	bar
Pressure loss at req. Flow nom.		0.077	0.015	bar
Pressure loss at req. Flow max.		0.307	0.061	bar
Velocity (meas. tube) at req. Flow min.		0.009	0.004	m/s
Velocity (meas. tube) at req. Flow nom.		0.009	0.004	m/s
Velocity (meas. tube) at req. Flow max.		0.035	0.015	m/s
Meas. error Vol. at req. Flow min.***		2.08	13.9	%
Meas. error Vol. at req. Flow nom.***		2.08	13.9	%
Meas. error Vol. at req. Flow max.***		0.52	3.47	%
Meas. error Mass at req. Flow min.***		2.08	13.9	%
Meas. error Mass at req. Flow nom.***		2.08	13.9	%
Meas. error Mass at req. Flow max.***		0.52	3.47	%
Meas. error Spec. Mass at req. Flow min.***		2.08	13.9	%
Meas. error Spec. Mass at req. Flow nom.***		2.08	13.9	%
Meas. error Spec. Mass at req. Flow max.***		0.52	3.47	%
Reynolds No.		0	0	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:18 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1055

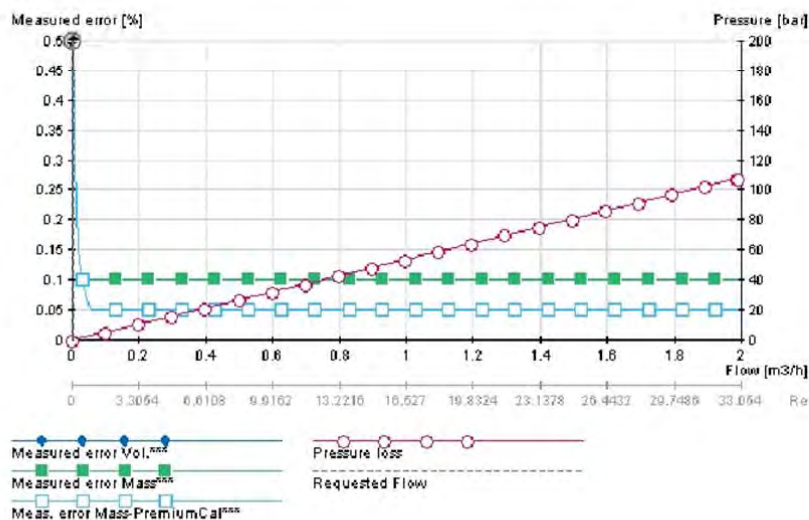
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Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN8 3/8"
Minimum Flow: 0 m3/h
Maximum Flow: 1.992 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 100FT-1059

Timestamp: 11.01.2013 05:10:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.9	18	23.76	m3/h
Oper. Pressure		24.5		bar_g
Oper. Temperature		36		°C
Density		608.8		kg/m3
Viscosity		0.34		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)	-7		80	°C
Vapor Pressure	5.85	5.85	5.85	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN50 2"
Minimum Flow	0 m3/h
Maximum Flow	114.98 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN50 2" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F50-E999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

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TAG : 100FT-1059

Timestamp: 11.01.2013 05:10:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.9	18	23.76	m3/h
Pressure loss	2.093E-4	0.053	0.089	bar
Velocity (meas. tube)	0.235	4.709	6.216	m/s
Measured error Vol.***	0.64	0.1	0.1	%
Measured error Mass***	0.64	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.64	0.05	0.05	%
Reynolds No.		360 079		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1059

Timestamp: 11.01.2013 05:10:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN40 1 1/2"	DN50 2"	DN80 3"	
Process connection	DN40 1 1/2" CI 600 ANSI/316L	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	73.916	114.98	295.664	m3/h
Pressure loss at req. Flow min.	0.001	2.093E-4	3.289E-5	bar
Pressure loss at req. Flow nom.	0.267	0.053	0.008	bar
Pressure loss at req. Flow max.	0.446	0.089	0.014	bar
Velocity (meas. tube) at req. Flow min.	0.514	0.235	0.097	m/s
Velocity (meas. tube) at req. Flow nom.	10.28	4.709	1.941	m/s
Velocity (meas. tube) at req. Flow max.	13.56	6.216	2.562	m/s
Meas. error Vol. at req. Flow min.***	0.41	0.64	1.64	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.41	0.64	1.64	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.41	0.64	1.64	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.08	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.06	%
Reynolds No.	531 935	360 079	231 162	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:50 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1059

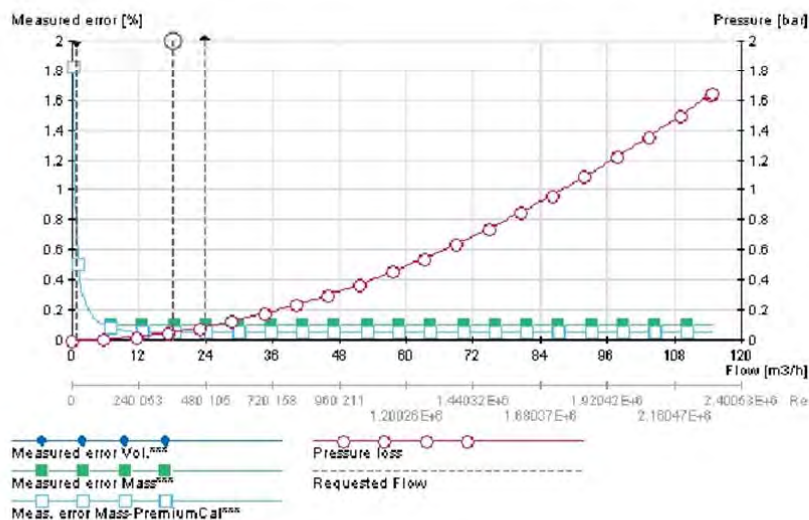
Timestamp: 11.01.2013 05:10:40 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN50 2"
Minimum Flow: 0 m3/h
Maximum Flow: 114.98 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1060

Timestamp: 11.01.2013 05:15:17 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	3.45	69	91.05	m3/h
Oper. Pressure		24.5		bar_g
Oper. Temperature	30		35	°C
Density		527.1		kg/m3
Viscosity		0.23		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			56	bar_g
Temp. design (min/max)	-7		130	°C
Vapor Pressure	21.59	21.59	21.59	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	341.491 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 100FT-1060

Timestamp: 11.01.2013 05:15:17 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	3.45	69	91.05	m3/h
Pressure loss	3.107E-4	0.079	0.132	bar
Velocity (meas. tube)	0.372	7.439	9.816	m/s
Measured error Vol.***	0.49	0.1	0.1	%
Measured error Mass***	0.49	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.49	0.05	0.05	%
Reynolds No.		1 309 917		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
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TAG : 100FT-1060

Timestamp: 11.01.2013 05:15:17 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI/316L	DN80 3" CI 600 ANSI/316L	DN100 4" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	132.802	341.491	664.011	m3/h
Pressure loss at req. Flow min.	0.002	3.107E-4	9.998E-5	bar
Pressure loss at req. Flow nom.	0.505	0.079	0.026	bar
Pressure loss at req. Flow max.	0.843	0.132	0.043	bar
Velocity (meas. tube) at req. Flow min.	0.903	0.372	0.233	m/s
Velocity (meas. tube) at req. Flow nom.	18.05	7.439	4.655	m/s
Velocity (meas. tube) at req. Flow max.	23.82	9.816	6.142	m/s
Meas. error Vol. at req. Flow min.***	0.19	0.49	0.77	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.19	0.49	0.77	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.19	0.49	0.77	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	2 040 448	1 309 917	1 036 165	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:50 AM CET

- 64 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1060

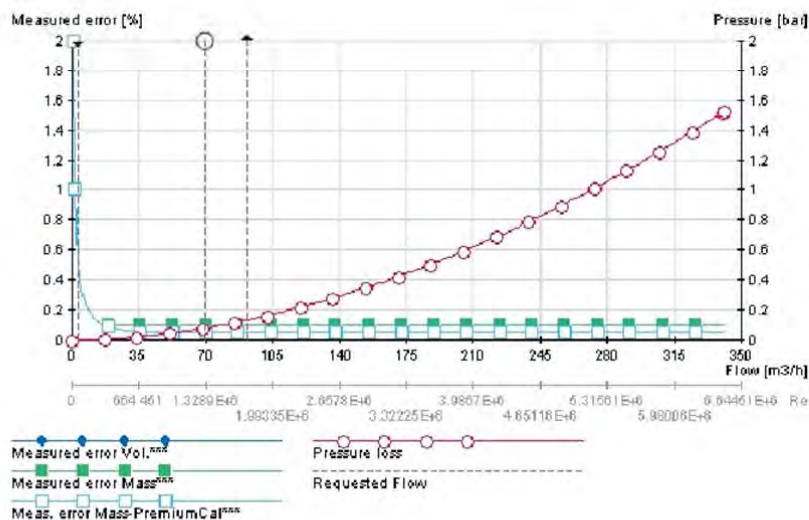
Timestamp: 11.01.2013 05:15:17 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 341.491 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:10:50 AM CET

- 65 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1226

Timestamp: 05.03.2013 10:22:41 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	52.2	174	191.4	m3/h
Oper. Pressure		3.8		bar_g
Oper. Temperature	78		133	°C
Density		714.4		kg/m3
Viscosity		0.58		cSt
Sound Velocity		1 250		m/s
Pres. design (min/max)			10	bar_g
Temp. design (min/max)			210	°C
Vapor Pressure	1.8	1.8	1.8	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN100 4"
Minimum Flow	0 m3/h
Maximum Flow	489.922 m3/h
Material (sensor)	SS 1.4539/904L, ext.temp.
Process connection	DN100 4" CI 150 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F1H-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum fines content is 0.1 lbs/mmscf, with a maximum particle size of 10 µm.

Print date: 05.03.2013 11:10:50 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1226

Timestamp: 05.03.2013 10:22:41 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	52.2	174	191.4	m3/h
Pressure loss	0.026	0.241	0.287	bar
Velocity (meas. tube)	3.521	11.74	12.91	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.05	0.05	0.05	%
Reynolds No.		1 036 165		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:11:28 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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Fax: 0033825888009

TAG : 100FT-1226

Timestamp: 05.03.2013 10:22:41 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	HC		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN80 3"	DN100 4"	DN150 6"	
Process connection	DN80 3" CI 150 ANSI/316L	DN100 4" CI 150 ANSI/316L	DN150 6" CI 150 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	251.96	489.922	1 119.82	m3/h
Pressure loss at req. Flow min.	0.081	0.026	0.01	bar
Pressure loss at req. Flow nom.	0.747	0.241	0.092	bar
Pressure loss at req. Flow max.	0.891	0.287	0.11	bar
Velocity (meas. tube) at req. Flow min.	5.628	3.521	1.945	m/s
Velocity (meas. tube) at req. Flow nom.	18.76	11.74	6.482	m/s
Velocity (meas. tube) at req. Flow max.	20.64	12.91	7.13	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.05	0.09	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	1 309 917	1 036 165	769 980	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1226

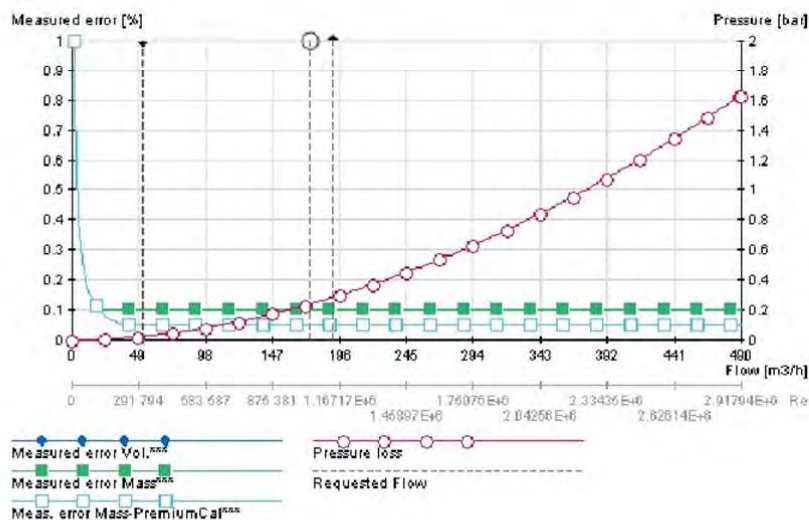
Timestamp: 05.03.2013 10:22:41 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN100 4"
Minimum Flow: 0 m3/h
Maximum Flow: 489.922 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:11:28 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1229 Case 1

Timestamp: 11.01.2013 05:21:25 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	5.52	92	101.2	m3/h
Oper. Pressure		69		bar_g
Oper. Temperature	10		110	°C
Density		991		kg/m3
Viscosity		0.59		cSt
Sound Velocity		1 619		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)	-40		120	°C
Vapor Pressure	2.405	3.256	4.632	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	181.635 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application excluded

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-F999F91NA8EKKPKJZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum sands content is 0.25 lbs/mmscf, with a maximum particle size of 260 µm.

Print date: 05.03.2013 11:11:28 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1229 Case 1

Timestamp: 11.01.2013 05:21:25 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	5.52	92	101.2	m3/h
Pressure loss	0.002	0.319	0.381	bar
Velocity (meas. tube)	0.595	9.919	10.91	m/s
Measured error Vol.***	0.16	0.1	0.1	%
Measured error Mass***	0.16	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.16	0.05	0.05	%
Reynolds No.		680 861		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:11:28 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 100FT-1229 Case 1

Timestamp:	11.01.2013 05:21:25 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Tri-Size Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI / Alloy C-22 / 2.4602	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602	DN100 4" CI 600 ANSI / Alloy C-22 / 2.4602	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.636	181.635	353.179	m3/h
Pressure loss at req. Flow min.	0.011	0.002	5.64E-4	bar
Pressure loss at req. Flow nom.	2.031	0.319	0.103	bar
Pressure loss at req. Flow max.	2.423	0.381	0.123	bar
Velocity (meas. tube) at req. Flow min.	1.444	0.595	0.372	m/s
Velocity (meas. tube) at req. Flow nom.	24.07	9.919	6.206	m/s
Velocity (meas. tube) at req. Flow max.	26.47	10.91	6.827	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.16	0.26	%
Meas. error Vol. at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.16	0.26	%
Meas. error Mass at req. Flow nom.***	n.a.	0.1	0.1	%
Meas. error Mass at req. Flow max.***	n.a.	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.06	0.16	0.26	%
Meas. error Spec. Mass at req. Flow nom.***	n.a.	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	n.a.	0.05	0.05	%
Reynolds No.	1 060 572	680 861	538 572	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:11:28 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1229 Case 1

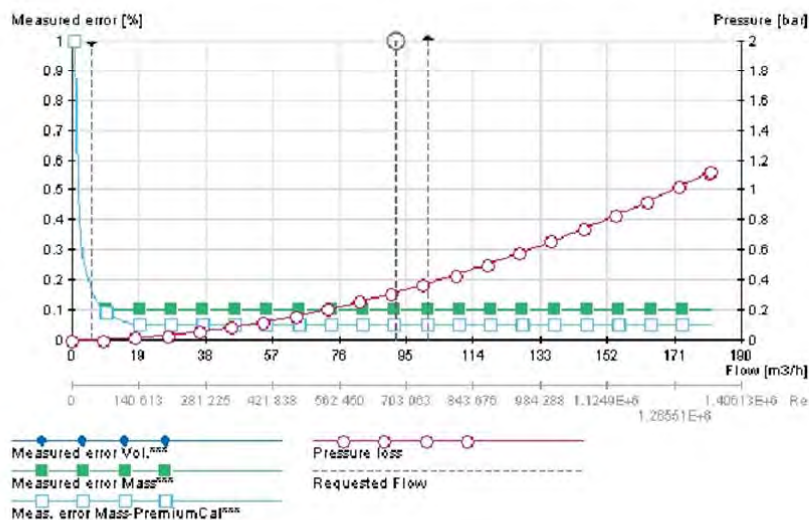
Timestamp: 11.01.2013 05:21:25 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 181.635 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:11:28 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1229 Case 2

Timestamp: 05.03.2013 10:48:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	2.76	46	50.6	m3/h
Oper. Pressure		31.5		bar_g
Oper. Temperature	10		110	°C
Density		989.6		kg/m3
Viscosity		0.55		cSt
Sound Velocity		1 619		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)	-40		120	°C
Vapor Pressure	1.3066E-4	0.0791	1.7482	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	181.892 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application excluded

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-F999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Note 1 : Fluid with maximum sands content is 0.25 lbs/mm³cf, with a maximum particle size of 260 µm.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1229 Case 2

Timestamp: 05.03.2013 10:48:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	2.76	46	50.6	m3/h
Pressure loss	4.77E-4	0.087	0.104	bar
Velocity (meas. tube)	0.298	4.959	5.455	m/s
Measured error Vol.***	0.33	0.1	0.1	%
Measured error Mass***	0.33	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.33	0.05	0.05	%
Reynolds No.		365 189		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:11:28 AM CET
Applicator®: 10.14.00 / 121

- 75 / 141 -

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1229 Case 2

Timestamp: 05.03.2013 10:48:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Water + Glycol		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Note 1	Standard	ANSI/ASME
Fluid Group (PED)	Not considered for PED		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 600 ANSI / Alloy C-22 / 2.4602	DN80 3" CI 600 ANSI / Alloy C-22 / 2.4602	DN100 4" CI 600 ANSI / Alloy C-22 / 2.4602	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.736	181.892	353.678	m3/h
Pressure loss at req. Flow min.	0.003	4.77E-4	1.535E-4	bar
Pressure loss at req. Flow nom.	0.553	0.087	0.028	bar
Pressure loss at req. Flow max.	0.659	0.104	0.033	bar
Velocity (meas. tube) at req. Flow min.	0.722	0.298	0.186	m/s
Velocity (meas. tube) at req. Flow nom.	12.03	4.959	3.103	m/s
Velocity (meas. tube) at req. Flow max.	13.24	5.455	3.413	m/s
Meas. error Vol. at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.13	0.33	0.51	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	568 852	365 189	288 870	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1229 Case 2

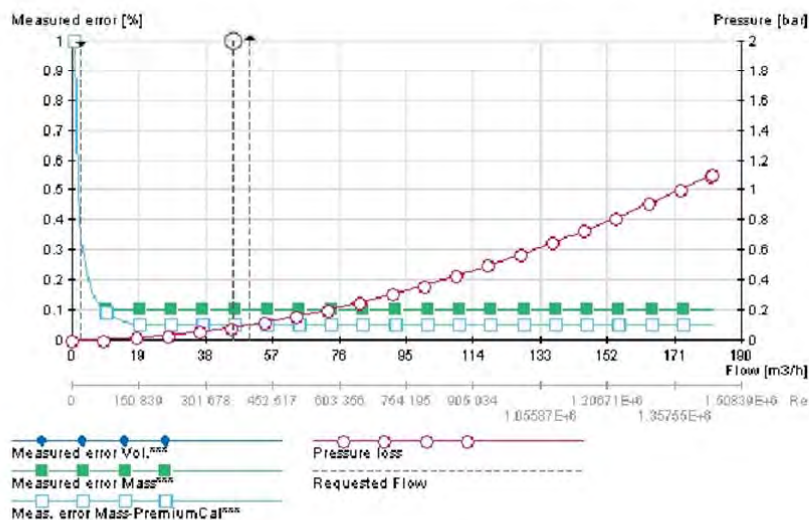
Timestamp: 05.03.2013 10:48:02 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 181.892 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:11:28 AM CET

- 77 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1231

Timestamp: 05.03.2013 10:50:18 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Demulsifier		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.003	0.003	0.027	m3/h
Oper. Pressure		74		bar_g
Oper. Temperature		29		°C
Density	930		970	kg/m3
Viscosity		21.7		cSt
Sound Velocity		1 512		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)			120	°C
Vapor Pressure	0.0199	0.035	0.25	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN8 3/8"
Minimum Flow	0 m3/h
Maximum Flow	2.105 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp
Process connection	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F08-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1231

Timestamp: 05.03.2013 10:50:18 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.003	0.003	0.027	m3/h
Pressure loss	0.001	0.001	0.015	bar
Velocity (meas. tube)	0.016	0.016	0.164	m/s
Measured error Vol.***	1.19	1.19	0.12	%
Measured error Mass***	1.19	1.19	0.12	%
Meas. error Mass-PremiumCal***	1.19	1.19	0.12	%
Reynolds No.		4		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

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Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1231

Timestamp: 05.03.2013 10:50:18 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Demulsifier		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter		Promass 83F	Promass 83F	
Flow Principle		Coriolis (Promass)	Coriolis (Promass)	
Meter Size		DN8 3/8"	DN15 1/2"	
Process connection		DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602	
Minimum Flow		0	0	m3/h
Maximum Flow		2.105	6.842	m3/h
Pressure loss at req. Flow min.		0.001	2.886E-4	bar
Pressure loss at req. Flow nom.		0.001	2.886E-4	bar
Pressure loss at req. Flow max.		0.015	0.003	bar
Velocity (meas. tube) at req. Flow min.		0.016	0.007	m/s
Velocity (meas. tube) at req. Flow nom.		0.016	0.007	m/s
Velocity (meas. tube) at req. Flow max.		0.164	0.068	m/s
Meas. error Vol. at req. Flow min.***		1.19	7.94	%
Meas. error Vol. at req. Flow nom.***		1.19	7.94	%
Meas. error Vol. at req. Flow max.***		0.12	0.79	%
Meas. error Mass at req. Flow min.***		1.19	7.94	%
Meas. error Mass at req. Flow nom.***		1.19	7.94	%
Meas. error Mass at req. Flow max.***		0.12	0.79	%
Meas. error Spec. Mass at req. Flow min.***		1.19	7.94	%
Meas. error Spec. Mass at req. Flow nom.***		1.19	7.94	%
Meas. error Spec. Mass at req. Flow max.***		0.12	0.79	%
Reynolds No.		4	3	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:12:12 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1231

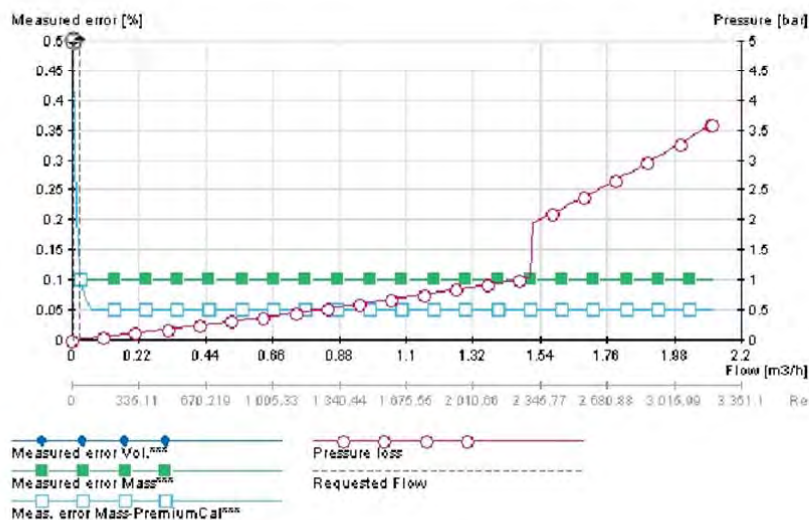
Timestamp: 05.03.2013 10:50:18 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN8 3/8"
Minimum Flow: 0 m3/h
Maximum Flow: 2.105 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1252

Timestamp: 05.03.2013 10:50:51 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.076	0.38	2.28	m3/h
Oper. Pressure		26.3		bar_g
Oper. Temperature		107		°C
Density		953		kg/m3
Viscosity		0.27		cSt
Sound Velocity		1 541		m/s
Pres. design (min/max)			30	bar_g
Temp. design (min/max)			160	°C
Vapor Pressure	1.29	1.29	1.29	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN25 1"
Minimum Flow	0 m3/h
Maximum Flow	18.888 m3/h
Material (sensor)	Alloy C-22/2.4602 -3.1B, ext.temp.
Process connection	DN25 1" CI 300 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F25-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 100FT-1252

Timestamp: 05.03.2013 10:50:51 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.076	0.38	2.28	m3/h
Pressure loss	8.54E-5	0.002	0.047	bar
Velocity (meas. tube)	0.093	0.467	2.8	m/s
Measured error Vol.***	0.71	0.14	0.1	%
Measured error Mass***	0.71	0.14	0.1	%
Meas. error Mass- PremiumCal***	0.71	0.14	0.05	%
Reynolds No.		20 740		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1252

Timestamp: 05.03.2013 10:50:51 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN15 1/2"	DN25 1"	DN40 1 1/2"	
Process connection	DN15 1/2" CI 300 ANSI/alloy C-22	DN25 1" CI 300 ANSI/Alloy C-22	DN40 1 1/2" CI 300 ANSI/Alloy C-22	
Minimum Flow	0	0	0	m3/h
Maximum Flow	6.821	18.888	47.219	m3/h
Pressure loss at req. Flow min.	2.607E-4	8.54E-5	1.573E-5	bar
Pressure loss at req. Flow nom.	0.005	0.002	3.124E-4	bar
Pressure loss at req. Flow max.	0.142	0.047	0.009	bar
Velocity (meas. tube) at req. Flow min.	0.194	0.093	0.043	m/s
Velocity (meas. tube) at req. Flow nom.	0.975	0.467	0.217	m/s
Velocity (meas. tube) at req. Flow max.	5.853	2.8	1.302	m/s
Meas. error Vol. at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.14	0.62	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.14	0.62	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.28	0.71	3.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.06	0.14	0.62	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.1	%
Reynolds No.	29 986	20 740	14 141	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:12:12 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1252

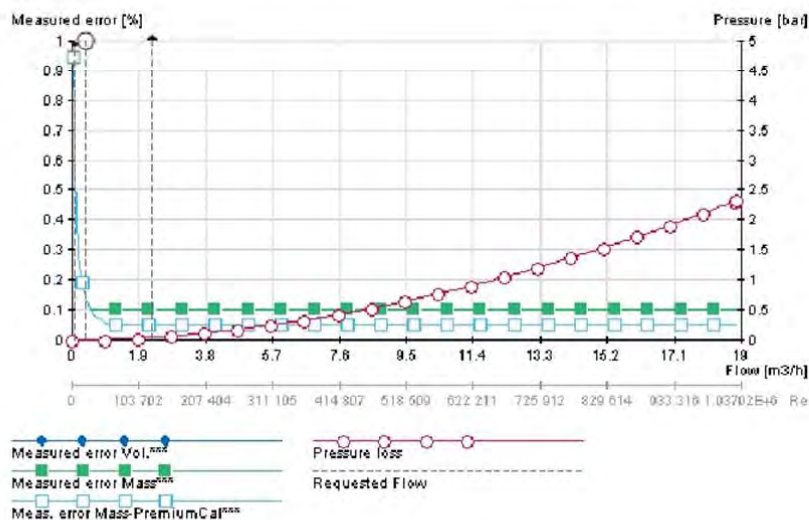
Timestamp: 05.03.2013 10:50:51 AM CET
Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN25 1"
Minimum Flow: 0 m3/h
Maximum Flow: 18.888 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:12:12 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 100FT-1255

Timestamp:	11.01.2013 05:31:21 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Anti Foam		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	0.001	0.001	0.006	m3/h
Oper. Pressure		74		bar_g
Oper. Temperature		29		°C
Density		1 004		kg/m3
Viscosity		2 000		cSt
Sound Velocity		1 512		m/s
Pres. design (min/max)			89	bar_g
Temp. design (min/max)			120	°C
Vapor Pressure	0.0199	0.035	0.25	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN8 3/8"
Minimum Flow	0 m3/h
Maximum Flow	1.992 m3/h
Material (sensor)	Alloy C-22/2.4602, ext.temp
Process connection	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602 ASME B16.5 flange
PED category** :	Application meets PED (Art.3.3)

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F08-F999B93NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 100FT-1255

Timestamp: 11.01.2013 05:31:21 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	0.001	0.001	0.006	m3/h
Pressure loss	0.077	0.077	0.307	bar
Velocity (meas. tube)	0.009	0.009	0.035	m/s
Measured error Vol.***	2.08	2.08	0.52	%
Measured error Mass***	2.08	2.08	0.52	%
Meas. error Mass-PremiumCal***	2.08	2.08	0.52	%
Reynolds No.		0		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:12:12 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1255

Timestamp: 11.01.2013 05:31:21 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Anti Foam		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter		Promass 83F	Promass 83F	
Flow Principle		Coriolis (Promass)	Coriolis (Promass)	
Meter Size		DN8 3/8"	DN15 1/2"	
Process connection		DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602	DN15 1/2" CI 600 ANSI / Alloy C-22 / 2.4602	
Minimum Flow		0	0	m3/h
Maximum Flow		1.992	6.474	m3/h
Pressure loss at req. Flow min.		0.077	0.015	bar
Pressure loss at req. Flow nom.		0.077	0.015	bar
Pressure loss at req. Flow max.		0.307	0.061	bar
Velocity (meas. tube) at req. Flow min.		0.009	0.004	m/s
Velocity (meas. tube) at req. Flow nom.		0.009	0.004	m/s
Velocity (meas. tube) at req. Flow max.		0.035	0.015	m/s
Meas. error Vol. at req. Flow min.***		2.08	13.9	%
Meas. error Vol. at req. Flow nom.***		2.08	13.9	%
Meas. error Vol. at req. Flow max.***		0.52	3.47	%
Meas. error Mass at req. Flow min.***		2.08	13.9	%
Meas. error Mass at req. Flow nom.***		2.08	13.9	%
Meas. error Mass at req. Flow max.***		0.52	3.47	%
Meas. error Spec. Mass at req. Flow min.***		2.08	13.9	%
Meas. error Spec. Mass at req. Flow nom.***		2.08	13.9	%
Meas. error Spec. Mass at req. Flow max.***		0.52	3.47	%
Reynolds No.		0	0	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:12:12 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 100FT-1255

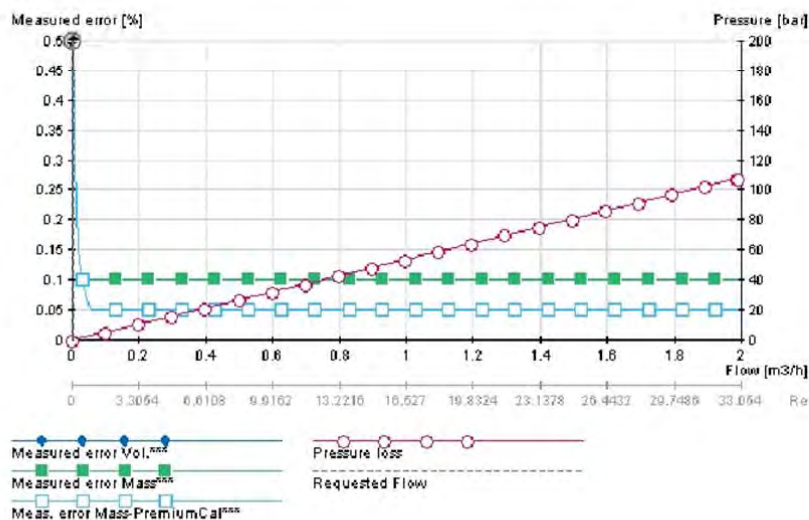
Timestamp: 11.01.2013 05:31:21 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN8 3/8"
Minimum Flow: 0 m3/h
Maximum Flow: 1.992 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 110FT-1033 Case 1

Timestamp:	11.01.2013 06:04:58 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Oper. Pressure		10.8		bar_g
Oper. Temperature		28		°C
Density		1 042		kg/m3
Viscosity		50		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.04	0.08	0.2	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	172.745 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1033 Case 1

Timestamp: 11.01.2013 06:04:58 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Pressure loss	0.036	0.12	0.168	bar
Velocity (meas. tube)	1.563	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.06	0.05	0.05	%
Reynolds No.		2 533		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:12:12 AM CET

- 91 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1033 Case 1

Timestamp: 11.01.2013 06:04:58 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	67.179	172.745	335.893	m3/h
Pressure loss at req. Flow min.	0.125	0.036	0.015	bar
Pressure loss at req. Flow nom.	0.765	0.12	0.046	bar
Pressure loss at req. Flow max.	1.072	0.168	0.054	bar
Velocity (meas. tube) at req. Flow min.	3.793	1.563	0.978	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.06	0.09	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	3 945	2 533	2 003	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:12:12 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1033 Case 1

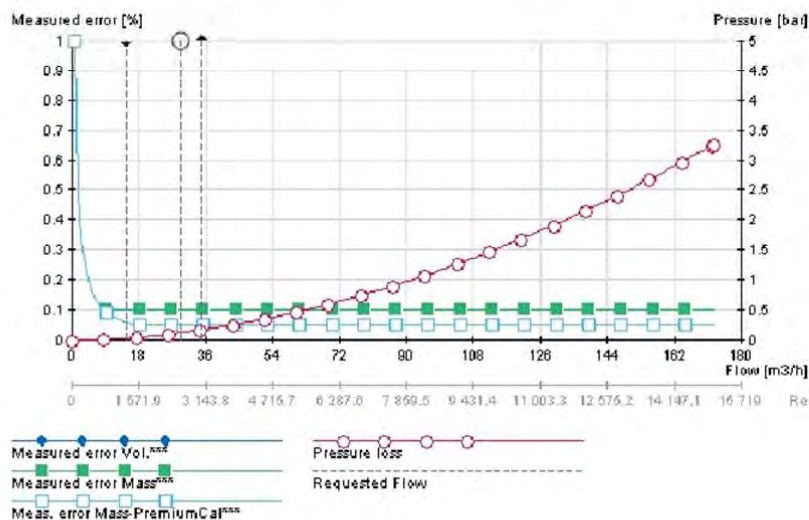
Timestamp: 11.01.2013 06:04:58 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 172.745 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 110FT-1033 Case 2

Timestamp:	11.01.2013 06:06:41 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Oper. Pressure		10.7		bar_g
Oper. Temperature		28		°C
Density		996		kg/m3
Viscosity		0.833		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.033	0.033	0.2978	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	180.723 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1033 Case 2

Timestamp: 11.01.2013 06:06:41 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Pressure loss	0.011	0.041	0.058	bar
Velocity (meas. tube)	1.563	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.06	0.05	0.05	%
Reynolds No.		152 011		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:13:01 AM CET
Applicator®: 10.14.00 / 121

- 95 / 141 -

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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Fax: 0033825888009

TAG : 110FT-1033 Case 2

Timestamp: 11.01.2013 06:06:41 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.281	180.723	351.406	m3/h
Pressure loss at req. Flow min.	0.073	0.011	0.004	bar
Pressure loss at req. Flow nom.	0.263	0.041	0.013	bar
Pressure loss at req. Flow max.	0.368	0.058	0.019	bar
Velocity (meas. tube) at req. Flow min.	3.793	1.563	0.978	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.06	0.1	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	236 787	152 011	120 243	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:01 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1033 Case 2

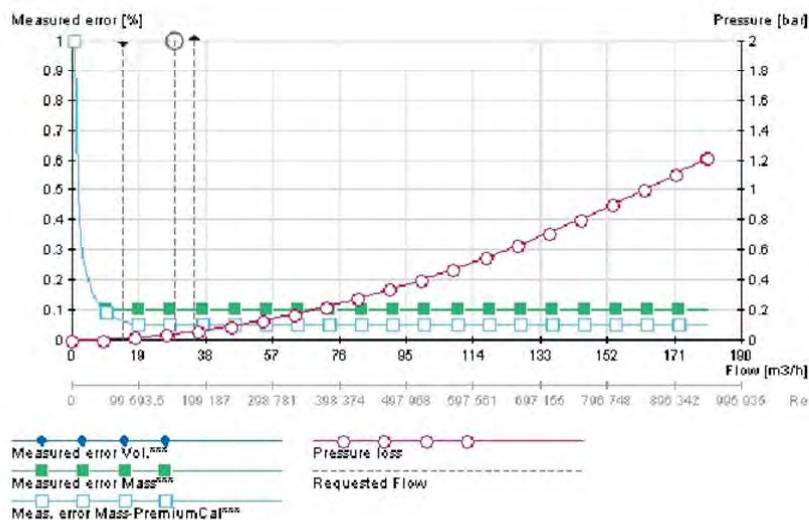
Timestamp: 11.01.2013 06:06:41 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m³/h
Maximum Flow: 180.723 m³/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:01 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1035 Case 1

Timestamp: 11.01.2013 05:59:43 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Oper. Pressure		10.8		bar_g
Oper. Temperature		28		°C
Density		1 042		kg/m3
Viscosity		50		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.04	0.08	0.2	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	172.745 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1035 Case 1

Timestamp: 11.01.2013 05:59:43 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Pressure loss	0.036	0.12	0.168	bar
Velocity (meas. tube)	1.563	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.06	0.05	0.05	%
Reynolds No.		2 533		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1035 Case 1

Timestamp: 11.01.2013 05:59:43 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	67.179	172.745	335.893	m3/h
Pressure loss at req. Flow min.	0.125	0.036	0.015	bar
Pressure loss at req. Flow nom.	0.765	0.12	0.046	bar
Pressure loss at req. Flow max.	1.072	0.168	0.054	bar
Velocity (meas. tube) at req. Flow min.	3.793	1.563	0.978	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.06	0.09	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	3 945	2 533	2 003	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1035 Case 1

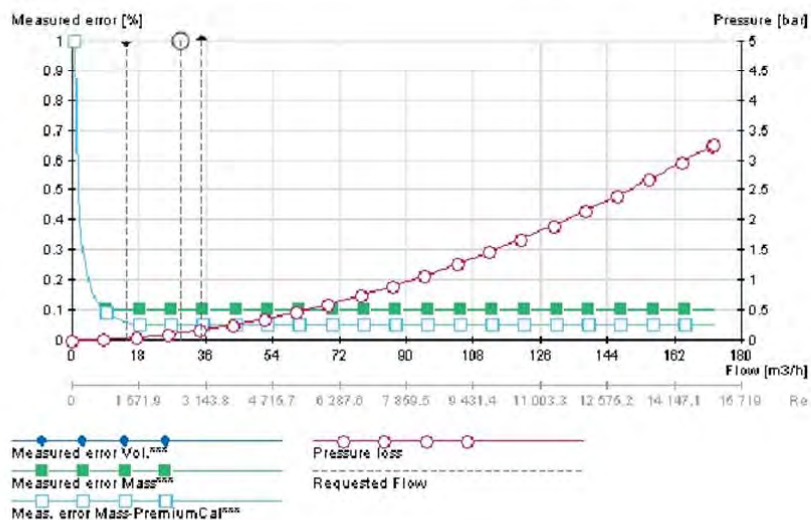
Timestamp: 11.01.2013 05:59:43 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m³/h
Maximum Flow: 172.745 m³/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:01 AM CET

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
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Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 110FT-1035 Case 2

Timestamp: 11.01.2013 06:01:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Oper. Pressure		10.7		bar_g
Oper. Temperature		28		°C
Density		996		kg/m3
Viscosity		0.833		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.033	0.033	0.2978	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	180.723 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 110FT-1035 Case 2

Timestamp: 11.01.2013 06:01:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	14.5	29	34.8	m3/h
Pressure loss	0.011	0.041	0.058	bar
Velocity (meas. tube)	1.563	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.06	0.05	0.05	%
Reynolds No.		152 011		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:13:01 AM CET
Applicator®: 10.14.00 / 121

- 103 / 141 -

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 110FT-1035 Case 2

Timestamp: 11.01.2013 06:01:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.281	180.723	351.406	m3/h
Pressure loss at req. Flow min.	0.073	0.011	0.004	bar
Pressure loss at req. Flow nom.	0.263	0.041	0.013	bar
Pressure loss at req. Flow max.	0.368	0.058	0.019	bar
Velocity (meas. tube) at req. Flow min.	3.793	1.563	0.978	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.06	0.1	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	236 787	152 011	120 243	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1035 Case 2

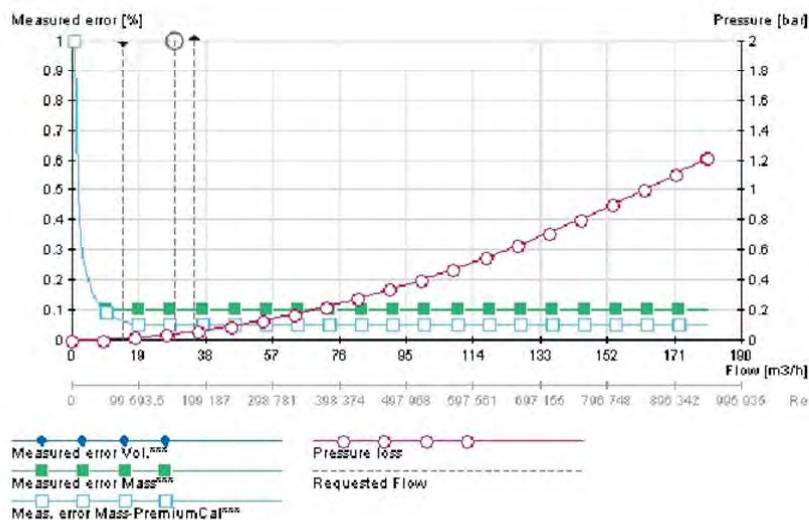
Timestamp: 11.01.2013 06:01:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 180.723 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1050 Case 1

Timestamp: 11.01.2013 05:56:10 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Oper. Pressure		11.1		bar_g
Oper. Temperature		28		°C
Density		1 042		kg/m3
Viscosity		50		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.04	0.08	0.2	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	172.745 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1050 Case 1

Timestamp: 11.01.2013 05:56:10 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Pressure loss	0.026	0.12	0.168	bar
Velocity (meas. tube)	1.251	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass- PremiumCal***	0.07	0.05	0.05	%
Reynolds No.		2 533		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:13:54 AM CET
Applicator®: 10.14.00 / 121

- 107 / 141 -

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1050 Case 1

Timestamp: 11.01.2013 05:56:10 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	67.179	172.745	335.893	m3/h
Pressure loss at req. Flow min.	0.097	0.026	0.011	bar
Pressure loss at req. Flow nom.	0.765	0.12	0.046	bar
Pressure loss at req. Flow max.	1.072	0.168	0.054	bar
Velocity (meas. tube) at req. Flow min.	3.035	1.251	0.783	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.07	0.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	3 945	2 533	2 003	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1050 Case 1

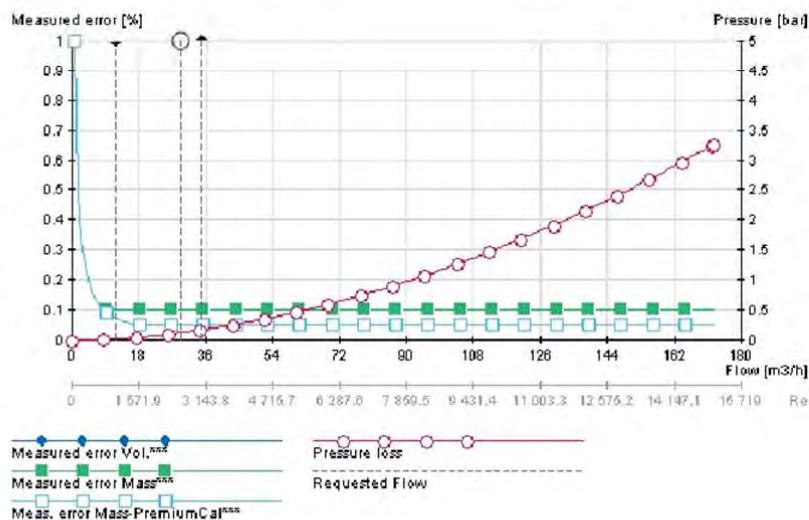
Timestamp: 11.01.2013 05:56:10 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m³/h
Maximum Flow: 172.745 m³/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 110FT-1050 Case 2

Timestamp:	11.01.2013 05:57:46 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Oper. Pressure		11		bar_g
Oper. Temperature		28		°C
Density		996		kg/m3
Viscosity		0.833		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.033	0.033	0.2978	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	180.723 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 110FT-1050 Case 2

Timestamp: 11.01.2013 05:57:46 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Pressure loss	0.008	0.041	0.058	bar
Velocity (meas. tube)	1.251	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.08	0.05	0.05	%
Reynolds No.		152 011		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1050 Case 2

Timestamp: 11.01.2013 05:57:46 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.281	180.723	351.406	m3/h
Pressure loss at req. Flow min.	0.048	0.008	0.002	bar
Pressure loss at req. Flow nom.	0.263	0.041	0.013	bar
Pressure loss at req. Flow max.	0.368	0.058	0.019	bar
Velocity (meas. tube) at req. Flow min.	3.035	1.251	0.783	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.08	0.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	236 787	152 011	120 243	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1050 Case 2

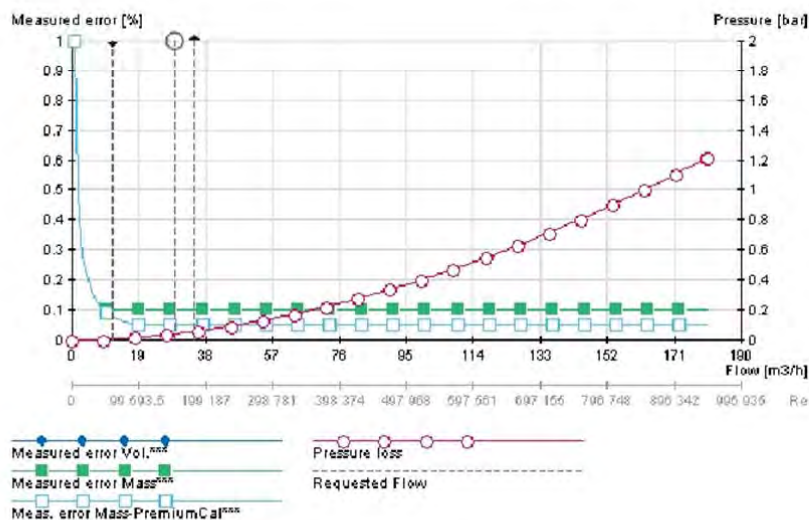
Timestamp: 11.01.2013 05:57:46 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 180.723 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 110FT-1051 Case 1

Timestamp:	11.01.2013 05:52:04 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Oper. Pressure		11.1		bar_g
Oper. Temperature		28		°C
Density		1 042		kg/m3
Viscosity		50		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.04	0.08	0.2	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	172.745 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1051 Case 1

Timestamp: 11.01.2013 05:52:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Pressure loss	0.026	0.12	0.168	bar
Velocity (meas. tube)	1.251	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.07	0.05	0.05	%
Reynolds No.		2 533		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1051 Case 1

Timestamp: 11.01.2013 05:52:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Spent Amine/Fresh Amine		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	67.179	172.745	335.893	m3/h
Pressure loss at req. Flow min.	0.097	0.026	0.011	bar
Pressure loss at req. Flow nom.	0.765	0.12	0.046	bar
Pressure loss at req. Flow max.	1.072	0.168	0.054	bar
Velocity (meas. tube) at req. Flow min.	3.035	1.251	0.783	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.07	0.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	3 945	2 533	2 003	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:13:54 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1051 Case 1

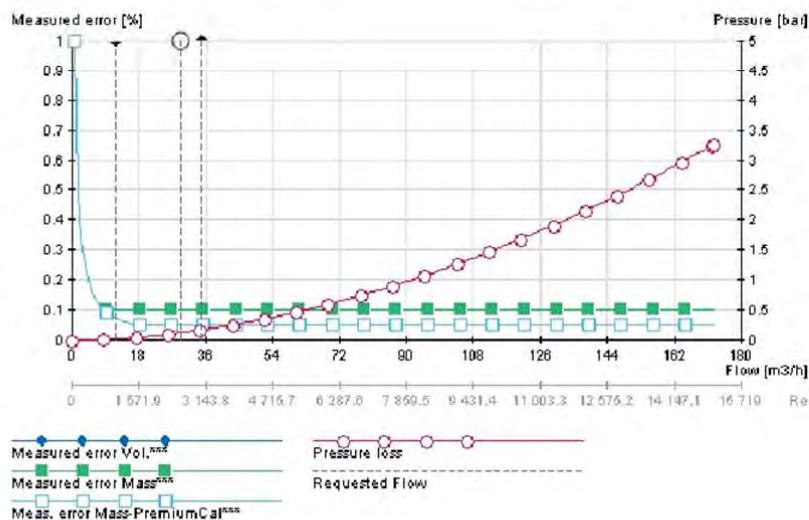
Timestamp: 11.01.2013 05:52:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m³/h
Maximum Flow: 172.745 m³/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 110FT-1051 Case 2

Timestamp:	11.01.2013 05:53:37 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Oper. Pressure		11		bar_g
Oper. Temperature		28		°C
Density		996		kg/m3
Viscosity		0.833		cSt
Sound Velocity		1 510		m/s
Pres. design (min/max)			16.2	bar_g
Temp. design (min/max)			70	°C
Vapor Pressure	0.033	0.033	0.2978	bar_a

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	180.723 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91?A8EKKPJJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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TAG : 110FT-1051 Case 2

Timestamp: 11.01.2013 05:53:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	11.6	29	34.8	m3/h
Pressure loss	0.008	0.041	0.058	bar
Velocity (meas. tube)	1.251	3.127	3.752	m/s
Measured error Vol.***	0.1	0.1	0.1	%
Measured error Mass***	0.1	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.08	0.05	0.05	%
Reynolds No.		152 011		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:14:08 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

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Fax: 0033825888009

TAG : 110FT-1051 Case 2

Timestamp: 11.01.2013 05:53:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Demineralized Water		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	70.281	180.723	351.406	m3/h
Pressure loss at req. Flow min.	0.048	0.008	0.002	bar
Pressure loss at req. Flow nom.	0.263	0.041	0.013	bar
Pressure loss at req. Flow max.	0.368	0.058	0.019	bar
Velocity (meas. tube) at req. Flow min.	3.035	1.251	0.783	m/s
Velocity (meas. tube) at req. Flow nom.	7.586	3.127	1.956	m/s
Velocity (meas. tube) at req. Flow max.	9.104	3.752	2.348	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.05	0.08	0.12	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.05	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	236 787	152 011	120 243	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:08 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 110FT-1051 Case 2

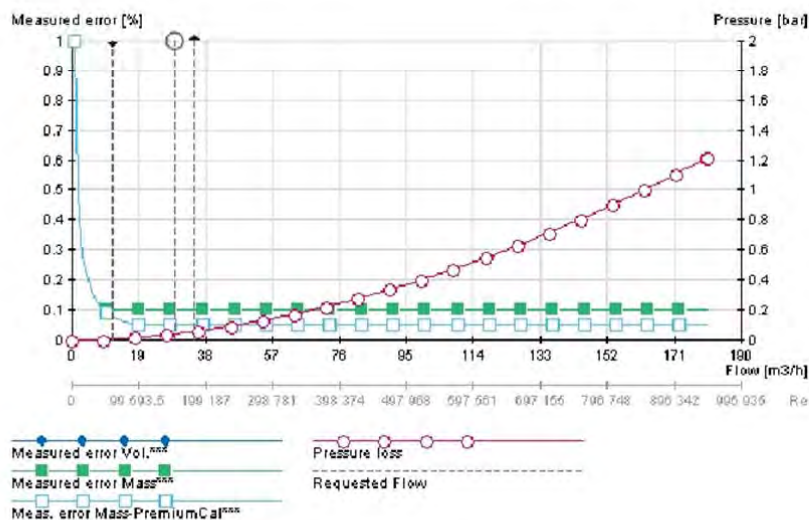
Timestamp: 11.01.2013 05:53:37 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 180.723 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:08 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 140FT-1006

Timestamp: 11.01.2013 05:46:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	NGL Column Bottom		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	22.985	208.951	229.846	m3/h
Oper. Pressure		30.7		bar_g
Oper. Temperature		73.2		°C
Density		429		kg/m3
Viscosity		0.145		cSt
Sound Velocity		1 120		m/s
Pres. design (min/max)			40	bar_g
Temp. design (min/max)	-130		150	°C
Vapor Pressure	30.46	30.46	30.46	bar_g

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN150 6"
Minimum Flow	0 m3/h
Maximum Flow	1 864.8 m3/h
Material (sensor)	SS 1.4404 / 316L -3.1B
Process connection	DN150 6" CI 600 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. III

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F1F-E999B91JA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 140FT-1006

Timestamp: 11.01.2013 05:46:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	22.985	208.951	229.846	m3/h
Pressure loss	9.295E-4	0.055	0.066	bar
Velocity (meas. tube)	0.856	7.784	8.562	m/s
Measured error Vol.***	0.32	0.1	0.1	%
Measured error Mass***	0.32	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.32	0.05	0.05	%
Reynolds No.		3 698 579		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:14:08 AM CET

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Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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Fax: 0033825888009

TAG : 140FT-1006

Timestamp: 11.01.2013 05:46:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	NGL Column Bottom		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN100 4"	DN150 6"	DN250 10"	
Process connection	DN100 4" CI 600 ANSI/316L	DN150 6" CI 600 ANSI/316L	DN250 10" CI 600 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	815.851	1 864.8	5 128.21	m3/h
Pressure loss at req. Flow min.	0.002	9.295E-4	2.106E-4	bar
Pressure loss at req. Flow nom.	0.144	0.055	0.013	bar
Pressure loss at req. Flow max.	0.172	0.066	0.015	bar
Velocity (meas. tube) at req. Flow min.	1.551	0.856	0.389	m/s
Velocity (meas. tube) at req. Flow nom.	14.1	7.784	3.534	m/s
Velocity (meas. tube) at req. Flow max.	15.51	8.562	3.887	m/s
Meas. error Vol. at req. Flow min.***	0.14	0.32	0.89	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.14	0.32	0.89	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.14	0.32	0.89	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.1	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.09	%
Reynolds No.	4 977 190	3 698 579	2 492 002	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:08 AM CET

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Applicator@: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 140FT-1006

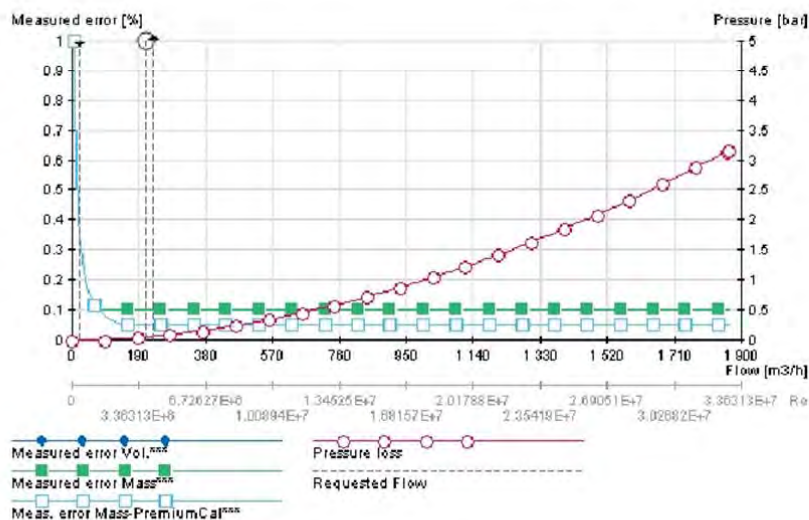
Timestamp: 11.01.2013 05:46:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN150 6"
Minimum Flow: 0 m3/h
Maximum Flow: 1 864.8 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:08 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 150FT-1008

Timestamp:	11.01.2013 05:44:04 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Deeth Bottom		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	16.04	160.4	176.4	m3/h
Oper. Pressure		20.42		bar_g
Oper. Temperature		86.6		°C
Density		458.4		kg/m3
Viscosity		0.159		cSt
Sound Velocity		1 158		m/s
Pres. design (min/max)			22	bar_g
Temp. design (min/max)	-90		150	°C
Vapor Pressure	20.09	20.09	20.09	bar_g

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN150 6"
Minimum Flow	0 m3/h
Maximum Flow	1 745.2 m3/h
Material (sensor)	SS 1.4404 / 316L -3.1B
Process connection	DN150 6" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. III

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F1F-E999B91JAEKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
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TAG : 150FT-1008

Timestamp: 11.01.2013 05:44:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	16.04	160.4	176.4	m ³ /h
Pressure loss	5.22E-4	0.037	0.044	bar
Velocity (meas. tube)	0.598	5.975	6.571	m/s
Measured error Vol.***	0.44	0.1	0.1	%
Measured error Mass***	0.44	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.44	0.05	0.05	%
Reynolds No.		2 589 200		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:14:44 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 150FT-1008

Timestamp: 11.01.2013 05:44:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Deeth Bottom		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN100 4"	DN150 6"	DN250 10"	
Process connection	DN100 4" CI 300 ANSI/316L	DN150 6" CI 300 ANSI/316L	DN250 10" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	763.525	1 745.2	4 799.3	m3/h
Pressure loss at req. Flow min.	0.001	5.22E-4	1.183E-4	bar
Pressure loss at req. Flow nom.	0.096	0.037	0.008	bar
Pressure loss at req. Flow max.	0.115	0.044	0.01	bar
Velocity (meas. tube) at req. Flow min.	1.082	0.598	0.271	m/s
Velocity (meas. tube) at req. Flow nom.	10.82	5.975	2.713	m/s
Velocity (meas. tube) at req. Flow max.	11.9	6.571	2.983	m/s
Meas. error Vol. at req. Flow min.***	0.19	0.44	1.2	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.11	%
Meas. error Mass at req. Flow min.***	0.19	0.44	1.2	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.11	%
Meas. error Spec. Mass at req. Flow min.***	0.19	0.44	1.2	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.12	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.11	%
Reynolds No.	3 484 295	2 589 200	1 744 533	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:44 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 150FT-1008

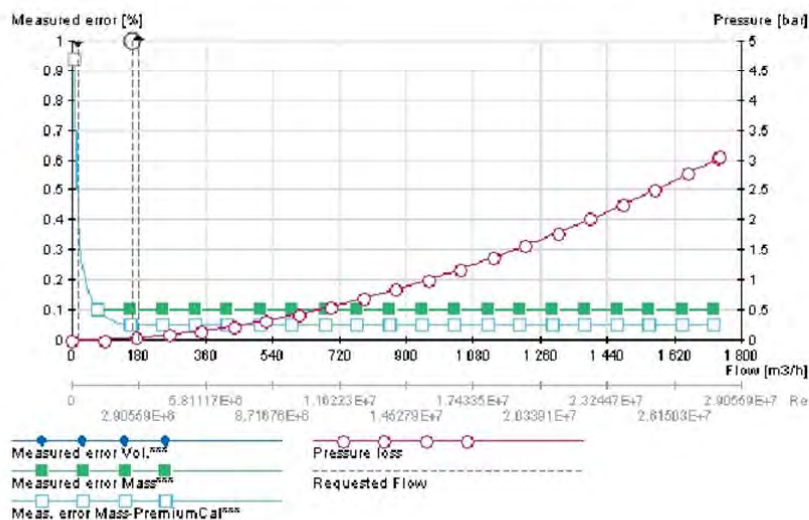
Timestamp: 11.01.2013 05:44:04 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN150 6"
Minimum Flow: 0 m3/h
Maximum Flow: 1 745.2 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:44 AM CET

- 129 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 150FT-1014

Timestamp:	11.01.2013 05:40:35 PM CET	Review number:	1
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Ethane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	7.75	17.6	38.36	m3/h
Oper. Pressure		23.4		bar_g
Oper. Temperature		-7.1		°C
Density		420.5		kg/m3
Viscosity		0.15		cSt
Sound Velocity		1 338		m/s
Pres. design (min/max)			28	bar_g
Temp. design (min/max)	-90		70	°C
Vapor Pressure	19.41	19.41	19.41	bar_g

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN50 2"
Minimum Flow	0 m3/h
Maximum Flow	166.468 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN50 2" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F50-PE999B93JA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

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eMail: eric.prudhomme@fr.endress.com

TAG : 150FT-1014

Timestamp: 11.01.2013 05:40:35 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	7.75	17.6	38.36	m3/h
Pressure loss	0.006	0.029	0.122	bar
Velocity (meas. tube)	2.027	4.604	10.03	m/s
Measured error Vol.***	0.11	0.1	0.1	%
Measured error Mass***	0.11	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.11	0.05	0.05	%
Reynolds No.		798 042		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:14:44 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 150FT-1014

Timestamp: 11.01.2013 05:40:35 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Ethane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN40 1 1/2"	DN50 2"	DN80 3"	
Process connection	DN40 1 1/2" CI 300 ANSI/316L	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	107.015	166.468	428.062	m3/h
Pressure loss at req. Flow min.	0.032	0.006	9.977E-4	bar
Pressure loss at req. Flow nom.	0.145	0.029	0.005	bar
Pressure loss at req. Flow max.	0.612	0.122	0.019	bar
Velocity (meas. tube) at req. Flow min.	4.424	2.027	0.836	m/s
Velocity (meas. tube) at req. Flow nom.	10.05	4.604	1.897	m/s
Velocity (meas. tube) at req. Flow max.	21.9	10.03	4.136	m/s
Meas. error Vol. at req. Flow min.***	0.1	0.11	0.28	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.12	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.1	0.11	0.28	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.12	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.07	0.11	0.28	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.12	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.06	%
Reynolds No.	1 178 926	798 042	512 323	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:14:44 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 150FT-1014

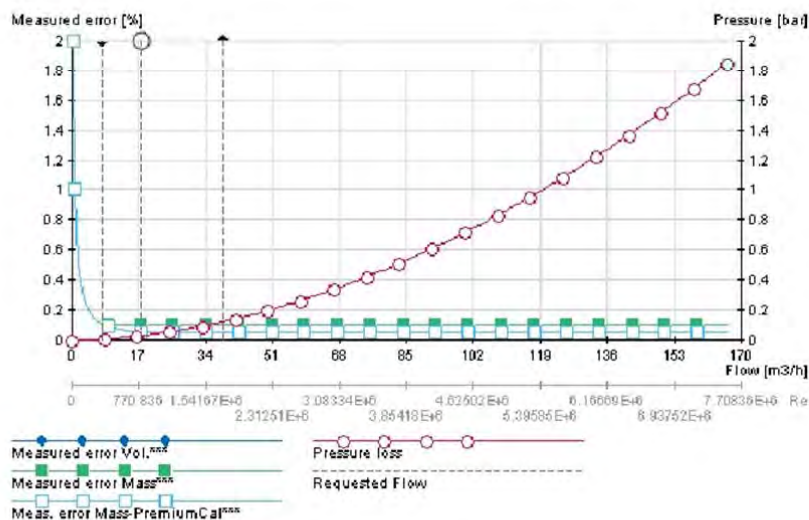
Timestamp: 11.01.2013 05:40:35 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN50 2"
Minimum Flow: 0 m3/h
Maximum Flow: 166.468 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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Contact person: M.PRUDHOMME Eric

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TAG : 150FT-1048

Timestamp: 11.01.2013 05:37:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

General Parameters

Fluid	Propane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	4.418	34	61.88	m3/h
Oper. Pressure		16.1		bar_g
Oper. Temperature		37.2		°C
Density		472.4		kg/m3
Viscosity		0.169		cSt
Sound Velocity		840.2		m/s
Pres. design (min/max)			21	bar_g
Temp. design (min/max)	-45		70	°C
Vapor Pressure	12	12	12	bar_g

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	381.033 m3/h
Material (sensor)	SS 1.4539/904L, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 150FT-1048

Timestamp: 11.01.2013 05:37:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	4.418	34	61.88	m3/h
Pressure loss	4.079E-4	0.018	0.054	bar
Velocity (meas. tube)	0.476	3.666	6.671	m/s
Measured error Vol.***	0.43	0.1	0.1	%
Measured error Mass***	0.43	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.43	0.06	0.05	%
Reynolds No.		878 445		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:15:06 AM CET
Applicator®: 10.14.00 / 121

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Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 150FT-1048

Timestamp: 11.01.2013 05:37:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Tri-Size Sheet

General Parameters

Fluid	Propane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	148.18	381.033	740.898	m3/h
Pressure loss at req. Flow min.	0.003	4.079E-4	1.313E-4	bar
Pressure loss at req. Flow nom.	0.113	0.018	0.006	bar
Pressure loss at req. Flow max.	0.343	0.054	0.017	bar
Velocity (meas. tube) at req. Flow min.	1.156	0.476	0.298	m/s
Velocity (meas. tube) at req. Flow nom.	8.894	3.666	2.294	m/s
Velocity (meas. tube) at req. Flow max.	16.19	6.671	4.174	m/s
Meas. error Vol. at req. Flow min.***	0.17	0.43	0.67	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.17	0.43	0.67	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.17	0.43	0.67	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.06	0.09	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	1 368 348	878 445	694 864	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:15:06 AM CET

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Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
Fax: 0033825888009

Contact person: M.PRUDHOMME Eric

Phone: 0033825888001
eMail: eric.prudhomme@fr.endress.com

TAG : 150FT-1048

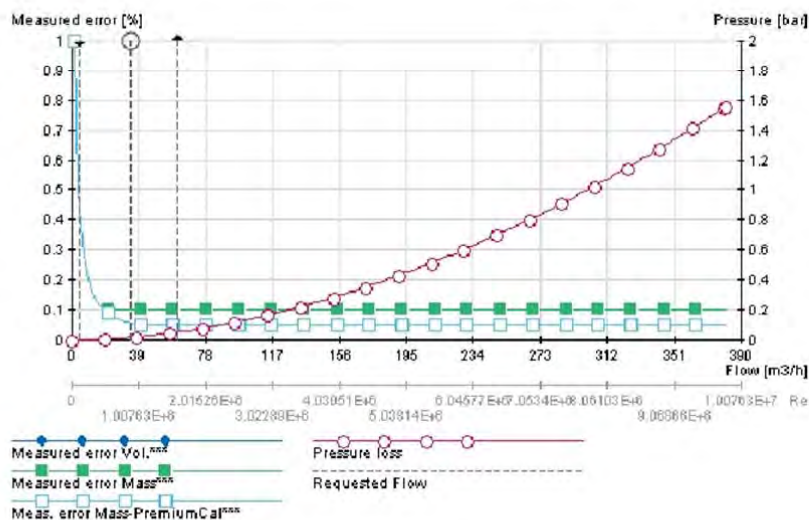
Timestamp: 11.01.2013 05:37:23 PM CET
Document number: 2000-03226-F14-10006

Review number: 1

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 381.033 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Print date: 05.03.2013 11:15:06 AM CET

- 137 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer:	SHELL	P.O.No.:	60869M-000-1547-00006-PO-03226
Contact person:	M.PRUDHOMME Eric	Phone:	0033825888001
		eMail:	eric.prudhomme@fr.endress.com
		Fax:	0033825888009

TAG : 150FT-1073

Timestamp:	11.01.2013 05:34:35 PM CET	Review number:	2
Document number:	2000-03226-F14-10006		

Sizing Sheet

General Parameters

Fluid	Butane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Operating Conditions

	minimum	nominal	maximum	
Requested Flow	3.55	44.4	47.95	m3/h
Oper. Pressure		14.9		bar_g
Oper. Temperature		44.4		°C
Density		543.7		kg/m3
Viscosity		0.224		cSt
Sound Velocity		798.5		m/s
Pres. design (min/max)			24	bar_g
Temp. design (min/max)	-10		70	°C
Vapor Pressure	4.38	4.38	4.38	bar_g

Flowmeter : Promass 83F

Flow Principle	Coriolis (Promass)
Meter Size	DN80 3"
Minimum Flow	0 m3/h
Maximum Flow	331.065 m3/h
Material (sensor)	SS 1.4539/904L -3.1B, ext.temp.
Process connection	DN80 3" CI 300 ANSI / 316L/1.4404 ASME B16.5 flange
PED category** :	Application is Cat. II

Extended order code

Qty	Item	Description	Extended order code
1	Flowmeter	Promass 83F	83F80-E999F91NA8EKKPJKZ1

** The PED category is an Endress+Hauser recommendation and depends on the fluid category, process data as well from the max. permissible pressure of the selected pressure rating. The fluids of the Applicator data base are classified to 67/548/EWG.

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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TAG : 150FT-1073

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Document number: 2000-03226-F14-10006

Review number: 2

Sizing Sheet

Sizing and Calculated Results

	minimum	nominal	maximum	
Requested Flow	3.55	44.4	47.95	m3/h
Pressure loss	3.355E-4	0.036	0.041	bar
Velocity (meas. tube)	0.383	4.787	5.17	m/s
Measured error Vol.***	0.47	0.1	0.1	%
Measured error Mass***	0.47	0.1	0.1	%
Meas. error Mass-PremiumCal***	0.47	0.05	0.05	%
Reynolds No.		865 481		

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

Warnings / Messages

Print date: 05.03.2013 11:15:06 AM CET

- 139 / 141 -

Applicator®: 10.14.00 / 121

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226

Contact person: M.PRUDHOMME Eric

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TAG : 150FT-1073

Timestamp: 11.01.2013 05:34:35 PM CET
Document number: 2000-03226-F14-10006

Review number: 2

Tri-Size Sheet

General Parameters

Fluid	Butane		
State	Liquid		
Character	Clean	Atmospheric Pressure	1.0132 bar_a
Abrasivity	Not abrasive	Standard	ANSI/ASME
Fluid Group (PED)	Dangerous Fluid (Fluid group 1)		

Sizing and Calculated Results

	Next Smaller Size	Current Size	Next Bigger Size	
Flow meter	Promass 83F	Promass 83F	Promass 83F	
Flow Principle	Coriolis (Promass)	Coriolis (Promass)	Coriolis (Promass)	
Meter Size	DN50 2"	DN80 3"	DN100 4"	
Process connection	DN50 2" CI 300 ANSI/316L	DN80 3" CI 300 ANSI/316L	DN100 4" CI 300 ANSI/316L	
Minimum Flow	0	0	0	m3/h
Maximum Flow	128.747	331.065	643.737	m3/h
Pressure loss at req. Flow min.	0.002	3.355E-4	1.08E-4	bar
Pressure loss at req. Flow nom.	0.229	0.036	0.012	bar
Pressure loss at req. Flow max.	0.264	0.041	0.013	bar
Velocity (meas. tube) at req. Flow min.	0.929	0.383	0.239	m/s
Velocity (meas. tube) at req. Flow nom.	11.61	4.787	2.995	m/s
Velocity (meas. tube) at req. Flow max.	12.54	5.17	3.235	m/s
Meas. error Vol. at req. Flow min.***	0.18	0.47	0.73	%
Meas. error Vol. at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Vol. at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow min.***	0.18	0.47	0.73	%
Meas. error Mass at req. Flow nom.***	0.1	0.1	0.1	%
Meas. error Mass at req. Flow max.***	0.1	0.1	0.1	%
Meas. error Spec. Mass at req. Flow min.***	0.18	0.47	0.73	%
Meas. error Spec. Mass at req. Flow nom.***	0.05	0.05	0.06	%
Meas. error Spec. Mass at req. Flow max.***	0.05	0.05	0.05	%
Reynolds No.	1 348 153	865 481	684 609	

***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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Endress+Hauser 
People for Process Automation

Applicator Sizing - Flow

Project : FLNG PRELUDE EPCI PROJECT

Customer: SHELL

P.O.No.: 60869M-000-
1547-00006-PO-03226
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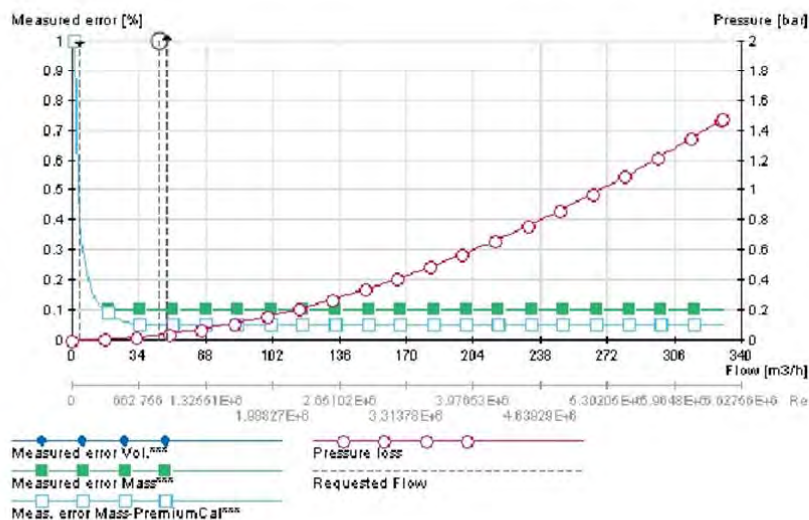
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Document number: 2000-03226-F14-10006

Review number: 2

Chart Sheet

Flowmeter : Promass 83F

Flow Principle: Coriolis (Promass)
Meter Size: DN80 3"
Minimum Flow: 0 m3/h
Maximum Flow: 331.065 m3/h



***For error calculation, the specified reference conditions for the calibration of the flowmeter according to ISO/IEC 17025 apply. Further information in technical documentation.

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